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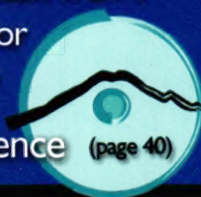
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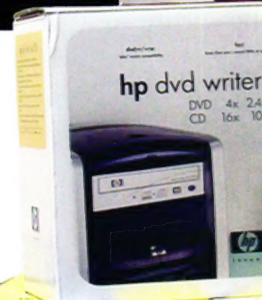
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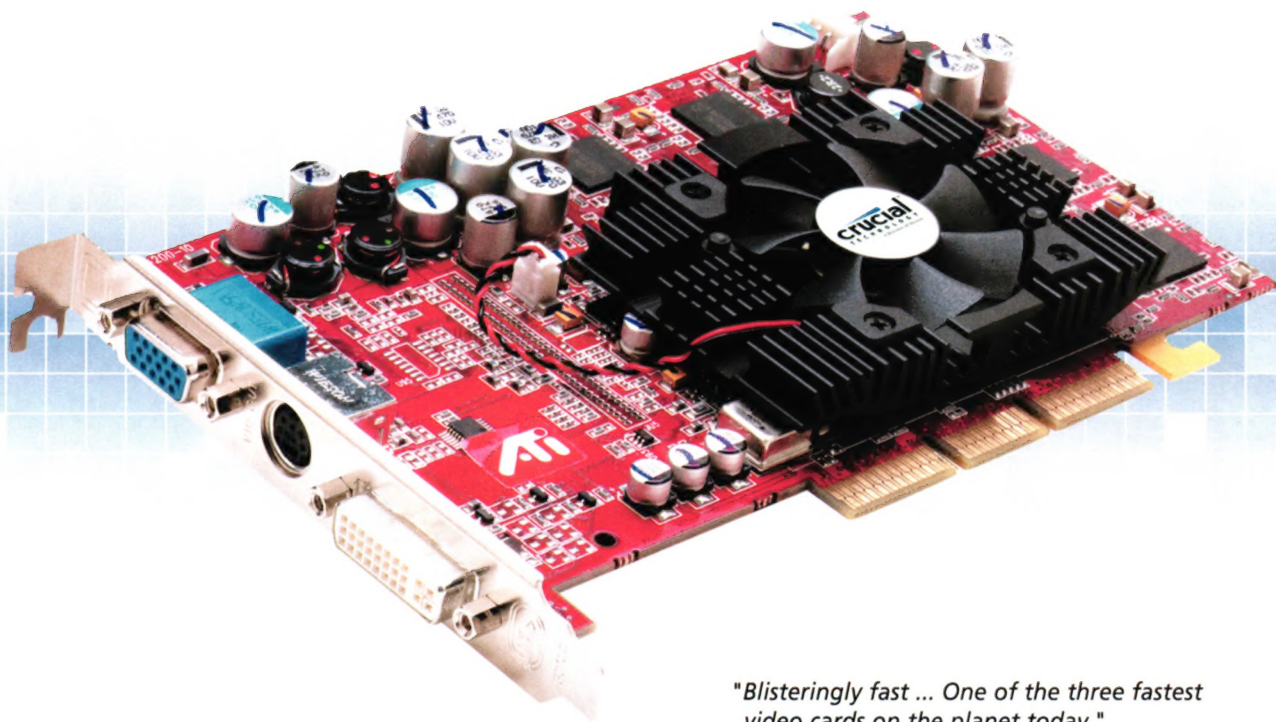
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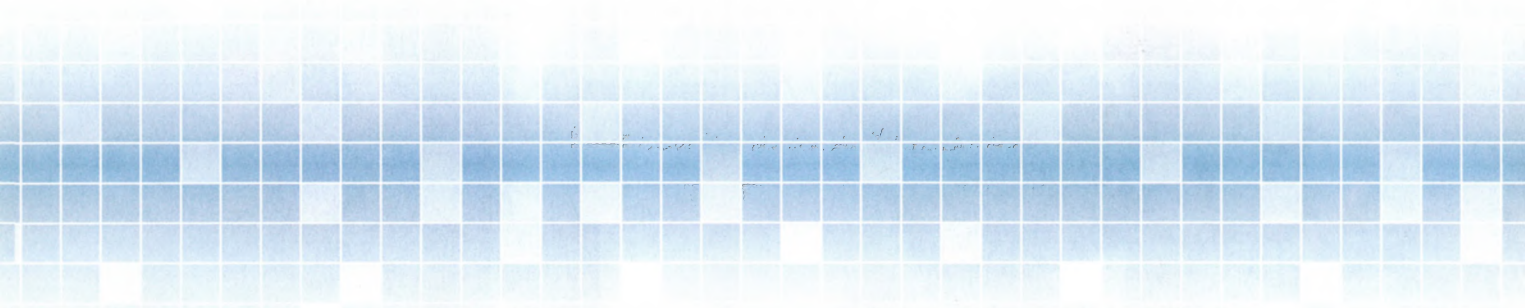


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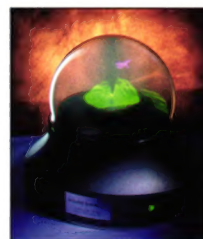


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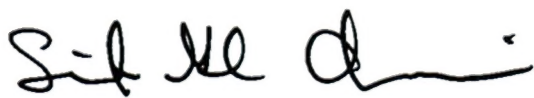


GREETINGS FROM SAMITLAND

Greetings, welcome back to another month of *CPU*. We've been working 'round the clock to get this issue closed before I head off to the Intel Developer Forum in San Jose. Some brutal hours for the team, but I think you will find the end result worthwhile. Marty and the labs tested nine DVD writers for our cover story and burned about 130 discs. (There were 111 movie discs, which were then all viewed in five home DVD players.) Why? Because we want to provide you with the information power users need to have while saving you from the thankless job of testing. At any rate, most of you probably already know that DVD burners are quickly coming into their own. We decided to take a good look at the latest batch of writers and media. Armed with this information, we're confident you'll end up with a solid purchase.

In other news, I feel that we've pretty much exhausted PC Challenge at the lower budgets, so we'll be making PC Challenge a quarterly-type piece, which will allow us to build systems at higher budgets. It also means I'll get a little more sleep instead of slaving away for 40 hours with just a five-hour break. One thing's for sure: You won't catch me crying, Argentina. And of course, we'd be happy to hear your PC Challenge suggestions at editor@cpumag.com.

OK, time to get back to closing this issue. I've got a nice little surprise for you in the upcoming May issue, so prepare to be entertained. Look forward to seeing you back here next month. Ta.



Samit G. Choudhuri, Publication Editor, *CPU*



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Editorial Staff
editor@cpumag.com
FAX: (402) 479-2104
131 W. Grand Drive
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Advertising Staff
(800) 848-1478
120 W. Harvest Dr.
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CORRECTIONS

Page 77/March 2003: The URL in the Munchology piece should be candycritic.org.

Page 87/ February 2003: The caption for the iPAQ h5450 should be a 400MHz X-Scale processor.



Gotcha.
Here it is.



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Ibis & IBM Team Up On Next-Gen Wafers

A large part of the battle for microprocessor supremacy is fought during wafer construction even before the first transistor is planted. IBM has recently announced yet another partnership, this time with Ibis Technology (www.ibis.com), to improve wafer technology in anticipation of coming processor requirements. Ibis designs, manufactures, and markets wafers based on its SIMOX-SOI technology, which the company says is superior to conventional wafer production processes.

"Because of decreasing feature size and increasing density of transistors, heat is increasing substantially," says Ibis president and CEO Martin Reid. "SOI has less power produced in transistors and decouples the main silicon substrate from the integrated circuit so we run cooler, faster, and with reduced error problems and processor steps."

Ibis and IBM are joining research resources to produce wafers with thinner layers composed of more efficient materials. Without these advances, chip makers will have a tough time coping with the massive heat generated in future processor cores, temperature densities Intel engineers have previously compared to those found in a nuclear reactor. ▲



Ibis wafers may play an integral part in the advancement of CPU technology.

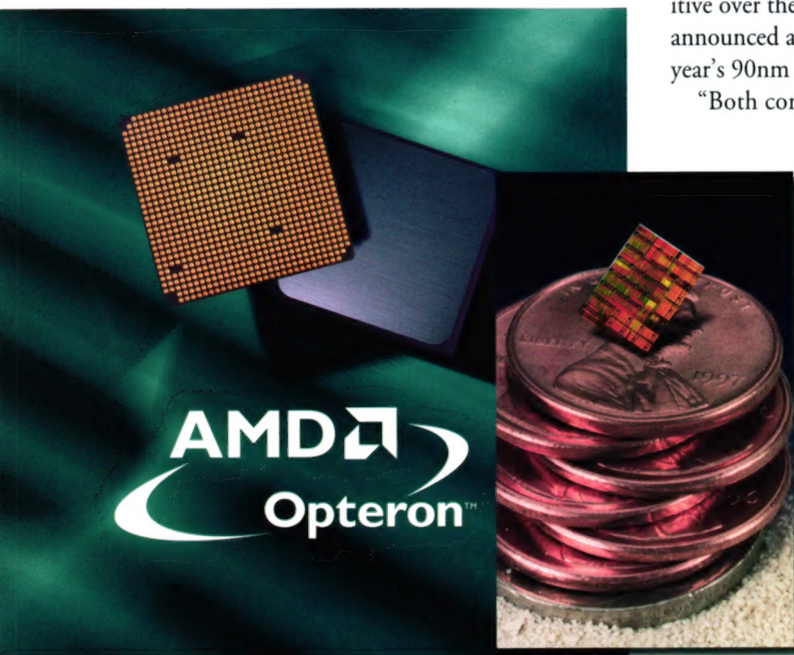
AMD & IBM: The "Virtual Gorilla" Roars On

The income statements tell the story: In 2002, AMD averaged roughly \$175 million per quarter in research and development. Intel averaged about \$1 billion per quarter. As each fabrication process shrink requires more resources and expertise, AMD finds itself in an increasingly problematic situation.

Deep-pocketed IBM, on the other hand, regularly garners the limelight for its semiconductor technology advances, not least of which was the groundbreaking SOI (silicon-on-insulator) approach. To stay competitive over the years, AMD has often teamed with IBM, and now the pair has announced a new three-year agreement that will take AMD beyond next year's 90nm process and on into 65nm and 45nm.

"Both companies bring to the alliance strong R&D talent," says AMD spokesperson Rob Keosheyan. "Joint development work on advanced technologies such as Strained-SOI (combining strained silicon and silicon-on-insulator within the same process) will benefit from both companies' core competencies in SOI. Down the road, this means higher performance products for future processor generations."

AMD adds that the alliance will let new technologies reach the market faster and at lower price points. ▲



The forthcoming Opteron processor is only the beginning for AMD's next-gen core technologies. AMD will work with IBM, which boasts SOI and copper interconnects among its many achievements, to stay in the race with Intel.

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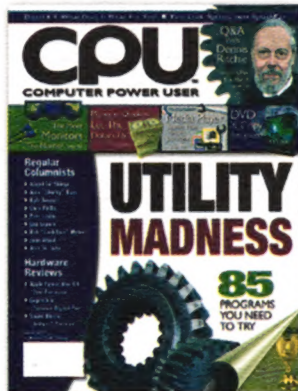
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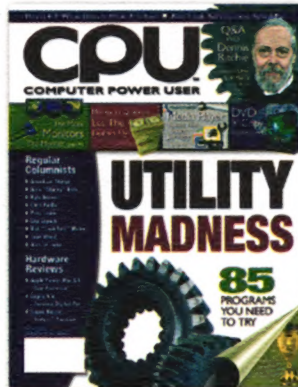
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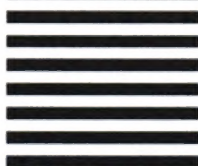
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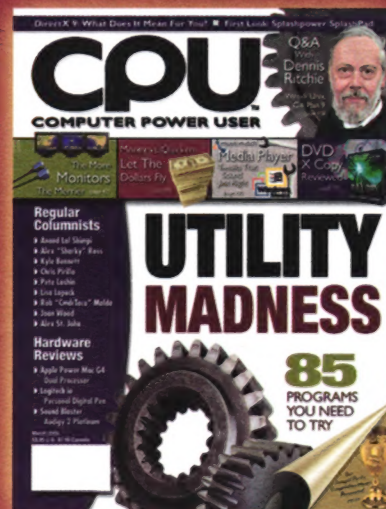


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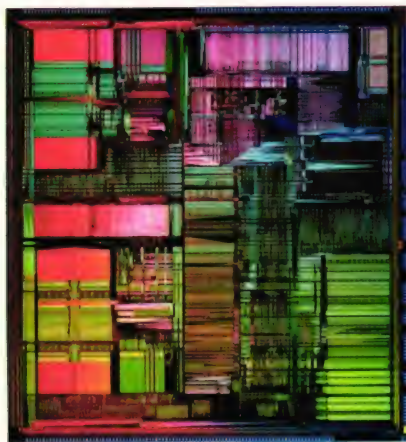
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Enter The Dragon

With China slated to become the second-largest PC market in the world by 2006, it should come as no surprise that the country wants to keep as much of that technology spending within the native economy as possible. American CPUs are often price prohibitive, and supporting Taiwan-based VIA is likely a galling prospect for the mainland's government. As a result, the Chinese Academy of Sciences' (CAS) Computer Institution designed and released the "Dragon Chip" last September.

Although the Dragon is expected to soon power everything from desktops to set-tops, the chip is now making headlines by garnering development partners in the private sector and in servers, such as Shuguang Tianyan Information Technology's "Soaring Dragon" computer.

Don't rush out to capture a Dragon just yet, though. Initial Dragon models run at 200MHz and 266MHz—an abrupt time warp back to the mid-1990s. The CAS, however, has stated that it wants China to standardize on the chip to help bolster security, particularly in military devices. Reports of Pentium 4 and Athlon chips somehow beaming secret data back to Uncle Sam have yet to reach the press, but anything is possible. ▲



Anxious to try a new Dragon CPU? You'll be buying technology much like this Pentium core from 1993.

Hardware Mole

Our endearingly myopic mole is always digging for the latest dirt in hardware. Here are a few choice nuggets.

Rambus Reverses Infineon Judgment

DRAM manufacturers, beware. In late January, the U.S. Court of Appeals overruled a lower court decision that threw out Rambus' patent infringement claims against No. 3 DRAM vendor Infineon. The legal fracas is very significant for the memory industry because Rambus owns patents on various chip technologies used by nearly all memory manufacturers. Most vendors contend that Rambus failed to demonstrate its proprietary ownership, and in the balance is more than a billion dollars in royalties.

The Federal Trade Commission last year filed an antitrust lawsuit against Rambus over its tactics, and allegations of document shredding have further muddled the waters.

Intel's Itanium 2 . . . Super-Sized

The next Itanium 2, code-named Madison, is due to start shipping in the middle of this year. Whereas today's Itanium 2 runs at 900MHz or 1GHz with as much as 3MB of Level 3 cache, the new and improved Madison will make the leap to 1.5GHz and sport as much as 6MB of cache. Madison's same-spec sibling, code-named Deerfield, will follow soon after and be a more "price-performance optimized version" of Madison aimed at blade servers, DP servers, workstations, and the like. In 2004, Itanium will step up to the Madison 9M, which will surpass 1.5GHz and carry a hefty 9MB L3 cache.

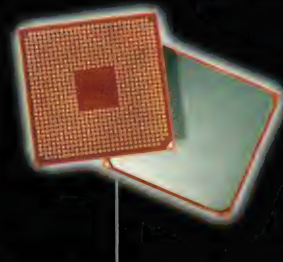
The follow-up chip to Madison is Montecito, slated to be Intel's first part produced with a 90nm fab process. Speculation and even a pinch of official confirmation has held that Intel would introduce a dual-core processor in Montecito's successor, but now Intel says that Montecito itself will have twin cores—essentially two brains in one head.



The Retraction's Retraction

Last month, we printed a correction for having previously written that AMD would delay its desktop x86-64 chip, aka Clawhammer, until "well into the second half of 2003," which at the time was not the official word from AMD. It seems we were right after all, although perhaps for the wrong reasons. AMD recently confirmed that Clawhammer would be delayed until the third quarter.

To balance out the unsavory news, AMD released the latest and greatest in its Athlon XP line, the 3000+, drawing even once again (give or take a bit) with Intel and the 3.06GHz Pentium 4.



Were you planning on having a shiny, new Athlon 64 for Easter? Better make that Halloween.

To continue the tradition established way back in July 2002, we bring you a page of the choicest chip news. Enjoy!

Clockless Chips May Be Faster

Fulcrum Microsystems is one of several startups that will be clocking in soon with clockless, or asynchronous, chips. Mike Zeal, vice president of marketing at the company spawned from the California Institute of Technology, says the company has created test chips since its formation in January 2000 and is now working with a major chip producer to create its first clockless chips for later this year. Clocks were added to chips in the 1960s to simplify chip design so that everything was synchronized to the pulse of a clock. But Zeal says keeping time creates overhead and wastes power by having all parts of the chip run in place when they aren't needed. That overhead actually slows things down now. Removing the clock lets parts of the chip race ahead of the slowest links and get the job done in less time and less wasted space, which reduces both power dissipation and cost. Zeal says to look for about 40 times the performance per square area of clock-based chips. ▲

Replacing Batteries With Micromachines

Today's soldiers are so weighed down with electronics that they might carry 50 pounds of batteries into the field. But Martin Schmidt, an electrical engineering professor at the Massachusetts Institute of Technology, told attendees at the International Solid State Circuits Conference in San Francisco that micromachines, or silicon chips that are fabricated to function like tiny mechanical devices, could provide power for portable electronics. An example: a tiny turbine that could rotate at as fast as 1 million revolutions per minute running on a combination of compressed air and butane fuel, which can be stored in throwaway modules such as cigarette lighters. Schmidt believes a tiny turbine could be 20 times more efficient than rechargeable batteries. But Schmidt says it will take time to develop the precise manufacturing required to build such a device. ▲

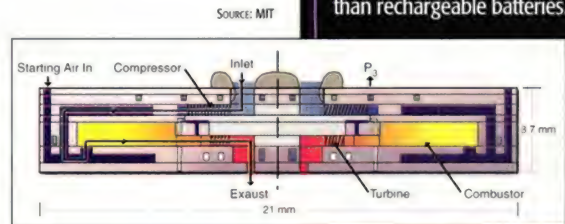
Turn Up The Body Heat, Scotty

Researchers at Seiko Epson and NTT are working on a wireless system that could take energy from body heat or cold water and convert it into electrical power. Yoshifumi Yoshida, a researcher at Seiko Epson, said the thermoelectric generator generated a milliwatt of power in an experiment. That was enough to power an oscillator and digital controller and to send a 300MHz wireless signal 16.5 feet from a transmitter to a receiver. The generator consisted of a combination of bismuth and tellurium compounds, electrodes, and insulated metal plates. Yoshida hopes that body heat or water may be enough to power self-sufficient devices in a future world with ubiquitous computing. ▲



Fulcrum Microsystems promises asynchronous chips later this year.

This kind of tiny microturbine, no bigger than a shirt button, could use butane fuel and compressed air to produce energy as much as 20 times more efficiently than rechargeable batteries.



Watching The Chips Fall

Here's a rundown of the latest AMD and Intel CPU pricing information compared with initial release pricing.

CPU	Released	Original Price	Current Price	Last Month's Price
AMD Athlon XP 1600 +	10/09/2001	\$160	\$44	\$57
AMD Athlon XP 1700 +	10/09/2001	\$190	\$48	\$48
AMD Athlon XP 1800 +	10/09/2001	\$252	\$63	\$64
AMD Athlon XP 1900 +	11/05/2001	\$269	\$71	\$69
AMD Athlon XP 2000 +	01/07/2002	\$339	\$76	\$77
AMD Athlon XP 2100 +	03/13/2002	\$420	\$86	\$89
AMD Athlon XP 2200 +	06/10/2002	\$241	\$108	\$136
AMD Athlon XP 2400 +	08/21/2002	\$193**	\$143	\$174
AMD Athlon XP 2600 +	08/21/2002	\$297**	\$243	\$276
AMD Athlon XP 2700 + 333MHz FSB	11/14/2002	\$349**	\$269	\$325
AMD Athlon XP 2800 + 333MHz FSB	11/14/2002	\$397**	\$378	\$397**
AMD Athlon XP 3000 + 333MHz FSB	02/10/2003	\$634*	\$634*	\$634*
Intel Pentium 4 1.5GHz	11/20/2000	\$819	\$111	\$106
Intel Pentium 4 1.6GHz	04/23/2001	\$294	\$114	\$114
Intel Pentium 4 1.7GHz	04/23/2001	\$352	\$123	\$121
Intel Pentium 4 1.8GHz	07/02/2001	\$562	\$135	\$133
Intel Pentium 4 1.9GHz	08/27/2001	\$375	\$145	\$145
Intel Pentium 4 2GHz	08/27/2001	\$562	\$160	\$161
Intel Pentium 4 2.2GHz	01/07/2002	\$562	\$175	\$190
Intel Pentium 4 2.4GHz 400MHz FSB	04/02/2002	\$562	\$193	\$193
Intel Pentium 4 2.5GHz 400MHz FSB	08/26/2002	\$243**	\$254*	\$248*
Intel Pentium 4 2.6GHz 400MHz FSB	08/26/2002	\$401**	\$295*	\$295*
Intel Pentium 4 2.26GHz 533MHz FSB	05/06/2002	\$423	\$198*	\$196*
Intel Pentium 4 2.4GHz 533MHz FSB	05/06/2002	\$562	\$191*	\$193
Intel Pentium 4 2.53GHz 533MHz FSB	05/06/2002	\$637	\$243	\$233*
Intel Pentium 4 2.66GHz 533MHz FSB	08/26/2002	\$401**	\$289*	\$294*
Intel Pentium 4 2.8GHz 533MHz FSB	08/26/2002	\$508**	\$399	\$379*
Intel Pentium 4 3.06GHz 533MHz FSB	11/14/2002	\$658*	\$623	\$629*

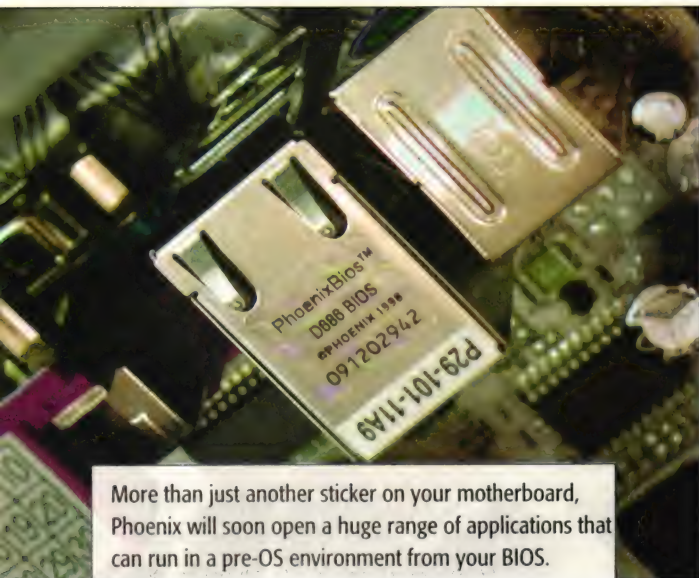
* Retail price** Manufacturer's price per 1,000 units. Other current prices, if indicated, are lowest OEM prices available through Pricegrabber.com

Phoenix BIOS Now Open For Apps

Phoenix Technologies would like you to get more mileage out of your BIOS chip. Already, Phoenix's FirstWare product family lets system builders establish an invisible HPA (host-protected area) in which the system's original configuration (OS, apps, and such) can be stored. Now, Phoenix is widening its approach to the hidden partition by announcing its Core Managed Environment platform, which essentially lets third-

party companies design and implement protected apps that are tied into the BIOS.

"If you totally hose your Windows operating system," says Phoenix's Bob Gager, senior director of product marketing, "soon you will be able to do a full recovery of your latest configuration [a la Roxio's GoBack]. You can also have a DVD player as a built-in function. Or MP3s. Or photos. Imagine if instead of having to wait through a full



More than just another sticker on your motherboard, Phoenix will soon open a huge range of applications that can run in a pre-OS environment from your BIOS.

boot, you could have an almost instant-on capability that boots into a photo application when you hit a function key at boot-up. And that app and its data are hidden in the HPA so that even if I do something drastic like an FDISK, those precious photographs won't be deleted." ▲

Lindows Does Media Center

Lindows.com has given the FIC Falcon (see February *CPU*, page 7) wings by making it into a fully functional "Media Center" PC running LindowsOS 3.0. Users boot into the media player interface—a roughly 10-second process—which includes on-screen controls for VCDs and DVDs, as well as a spectrum analyzer for MP3s. Press the ESC key, and LindowsOS loads.

With a multimedia player built into the BIOS or a full-blown OS available with the press of a key, then new Lindows system may be just the second or third box your LAN needs. Upgraded versions are available, but the entry-level unit (\$329 at iDOTpc.com) features a VIA C3 933MHz CPU, VIA PLE133 chipset, 128MB of PC133 SDRAM, 20GB hard drive, and 16X DVD-ROM with integrated audio, video, and 10/100 LAN. (There is no keyboard, mouse, or monitor included.)

"Affordability is the big change here," says Lindows.com CEO Michael Robertson.

"Because we're taking out the expensive OS cost, the price comes down, and that lets people find new uses and put the technology in more places." ▲

Lindows.com™
Bringing choice to your computer!

Software Shorts

Microsoft: It's Time For SPOT

Run, SPOT, run—and please don't crash!

SPOT (Smart Personal Objects Technology) is Microsoft's new platform that aims to computerize and make interactive everyday objects ranging from refrigerator magnets to wrist-watches. Microsoft worked with National Semiconductor for two years to arrive at a workable chipset small and robust enough to tackle the job. Also integral to the platform is a 100MHz RF chip that picks up an FM subcarrier band in order to bring fresh data to the device. Microsoft has leased this radio frequency and will call the entire delivery system DirectBand.

SPOT watches will support messaging, calendar updates, and the usual bevy of headline news, weather, finance, sports information, and soon GPS-related services.

There's A Bear In My Windows

Plenty of Russians have Windows, but now the Russian government has Microsoft's closely guarded Windows source code. But no, there were no spies involved.

Partly in response to the roughly 90% software piracy rate in Russia, Microsoft initiated its Government Security Program, which opens up Windows to foreign governments so that they can evaluate the OS' ability to withstand security attacks and learn how to integrate home-grown security programs into Windows. The move also sets Windows on a more level footing with Linux in terms of being open to scrutiny, although not to actual code modification.



Windows on your wrist? Not quite, but the new SPOT platform from Microsoft will bring you closer to Dick Tracy than ever before.

Journalist Eats Bitter Honey

Like Momma always said, don't judge a radical Islamic claim of cyber-terrorism by its cover. *Computerworld* staff writer and former intelligence expert Dan Verton learned this lesson when he went to press on Feb. 5 with a story about how "Harkat-ul-Mujahideen (HUM), a self-proclaimed radical Islamic jihadist organization . . . released the Slammer worm as part of a 'cyber jihad.'"

Later that day, *Computerworld* ran a second story based on a report by security firm mi2g describing the defacement of the radical group's site at harkatulmujahideen.org. The hacking was heralded as "the first confirmed case of anti-Islamic online retaliation."

However, the Islamic group, its spokesman, "Abu Mujahid," and the defacement were fabrications by freelance journalist Brian McWilliams. Originally,

McWilliams had purchased and run the site as a so-called honey pot to attract correspondence from Islamic radicals for use in articles. Verton initiated a series of email messages with "Mujahid" and was taken in by McWilliams' jihadist rhetoric and implausible "proof" of Slammer's authorship.

As McWilliams points out in his text at the present version of harkatulmujahideen.org, there were several clues for Verton to debunk the hoax. Verton and *Computerworld* actually made many attempts to confirm the story before going to press with it, but McWilliams' mission was merely to illustrate the dangers of relying on the Internet for factual reporting. ▲



Would you think this was an authentic radical Muslim site? At least one journalist did.

Ban Of The Spam

The numbers are in, and the people will be heard. In January, twin research reports on spam emerged from Harris Interactive and Ferris Research. The Harris Poll was conducted online by Harris Interactive between Nov. 22 and Dec. 2, 2002, among a national sample of 2,221 online adults aged 18 or older.

Harris Interactive found that 80% of respondents found spam "very annoying," up from 49% two and a half years

ago. What spam forms fried users' bacon the worst? Pornography topped the list at 90%, followed by mortgages/loans (79%), investments (68%), and real estate (61%). Between 70% to 80% of every demographic, regardless of race, gender, economic group, age, or political affiliation, favored legal action to make unsolicited email illegal.

Ferris Research reports that 30% of email ISPs receive is spam, while inboxes

at U.S.-based companies are filled with 15% to 20% spam. Between lost productivity, consumption of IT resources, and help desk time, the cost of spam to American businesses alone in 2002 was \$8.9 billion, and this doesn't even touch the projected wave of spam about to wash over cell phones via mobile messaging.

The chart below is based on answers to the question: How much of a problem are each of the following? ▲

Spam-O-Meter

	Annoying	Very annoying	Somewhat Annoying	Not Annoying	Not Very Annoying	Not Annoying At All
Spamming or getting unsolicited email from people who don't know you	96%	80%	16%	4%	3%	1%
Information you get from the Web that is not accurate or reliable	72%	32%	40%	29%	21%	7%
How long you have to wait for the information you want to come up on your screen	52%	17%	35%	48%	30%	18%
How long it takes to find the Web sites you are looking for or the Web sites you need	43%	10%	33%	57%	39%	19%
Times when you need help from someone outside your home to make your system work properly	50%	21%	30%	50%	27%	22%

Symantec Report Shows More Vulnerabilities, Fewer Attacks

Surprisingly, Symantec's Internet Security Threat Report, released in February, showed that overall cyber-attack activity has declined by 6% in the second half of 2002. The damage caused by recent widespread pathogens is also less now than in years past.

However, the number of total vulnerabilities present in 2002 was up 81.5% over those in 2001. According to Symantec, 85% of attacks documented in the second half of 2002 were "preattack reconnaissance" and companies were still averaging 30 attacks per week.

Vincent Weafer, senior director of Symantec Security Response, notes that the increase in vulnerabilities stems from several factors, including increasing disclosure from companies, vendors not making security a priority in their software, and new methods of exploiting bugs. Exacerbating the problem is the fact that it can take weeks or months to deploy security patches in enterprises, so installing patches on a daily basis is unrealistic.

Weafer adds that an analysis of the nearly 1.5 million submissions of Symantec Security Check test results during the last months of 2002 showed the following stark statistics:

Allowed unknown or unauthorized Internet communication:	26%
Did not have a recent version of a commonly used antivirus product:	32%
Used Web browsers that release information about their Web surfing activities to other Web sites without their knowledge:	58%

Loose Strands On The Web

Looking for some new surfing destinations? Here are a few sites you may have missed.

Pics For Less

If you've ever worked on a newsletter, commercial Web site, or any other mass media, you may know that licensing images is expensive. Just obtaining an ordinary, nonexclusive shot from a company such as Reuters or Corbis for a single month can cost far more than \$300. And why not? Most royalty-free images tend to stink. Fortunately, Photos.com now steps into the space between these extremes. The site just doubled its premium, royalty-free image count to 40,000. Users can choose the image in any of three resolutions. The only payment is for a standing subscription to the service, which runs \$49.95 for one week, \$99.95 for one month, \$249.95 for six months, or \$399.95 for one year.

Get a Job

The New York Times Job Market Web site (www.nytimes.com/jobmarket) is relaunched and better than ever. If you're a dot-com casualty or just ready for a career shift, check out the NYT's job content, which spans from 3,000 new listings each week to market data pulled from the newspaper's advertising department. Post your resume, read some insightful editorials, and much more.

Sell Phones

Got an old cell phone you're ready to toss? You're not alone.

According to Inform Inc., Americans will retire 130 million cell phones annually by 2005. But rather than add more toxic chemicals into our landfills, why not recycle your antique handset and make a few bucks? Go to www.cellforcash.com and find out if your phone qualifies for recycling. If so, the company will send you a box with prepaid postage followed by a check for your wireless paperweight.



Stop The Scams

Hey, wanna buy some property? Play a great-odds lottery? Oh, wait—you've won a free trip! Fraud scams work, and they're becoming more prominent, especially just across the U.S. border where it's almost impossible for the government to prosecute. So don't get scammed. Check out the Federal Trade Commission's new cross-border fraud site at www.ftc.gov/crossborder to learn about existing scams and how to dodge new ones.

BIOS Upgrades Available Online

COMPILED BY MARTY SEMS

Before you send another motherboard to the landfill, consider upgrading the BIOS and giving your PC a new outlook on life. Here are a few recently released upgrades. Subscribers can check out www.cpubag.com/cpuapr03/bios to see our entire upgrade list.

Motherboard	File (Date Available)	URL
Abit SR7-8X	sr7cm.exe (1/22/2003)	fae.abit.com.tw/eng/download/bios/sr7-8x.htm
AOpen AX4T-533 Pro	R1.07 (01/26/2003)	club.aopen.com.tw/downloads/
ASUS A7N8X	1002 (01/30/2003)	www.asus.com/support
ASUS P4B533	1013 (01/17/2003)	www.asus.com/support
Biostar M7VIP	vip0124b.exe (01/24/2003)	www.biostar.com.tw/products/mainboard/socket_a/m7vip/bios.php3
Intel D845WN	HV84510A.86A.0045.P14 (01/30/2003)	developer.intel.com/design/motherbd/wn/wn_bios.htm

YOU GET PAID
FOR THAT?

SITE DEVELOPER
DC COMICS

HOLY HOT JOB,
CAPED CRUSADER!

Want to play Robin to the comic book Batman? Get some skyscraper-swinging tips from Spider-Man himself as he rests between movie gigs? Here's your chance to be a super geek to the super heroes. DC Comics needs a Site Developer, someone who knows her way across a story arc as well as she knows her way around JavaScript and Flash scripting.

This job isn't just about knowing your Lex Luthor from your Crisis on Infinite Earth storylines. The Site Developer needs to be a writer, artist, animator, and Web coder, with knowledge of DHTML, Dreamweaver, and even a bunch of database protocols. And there is a lot of creative coding to be done here. The DC Comics site has a trove of Flash trailers for upcoming comic books and even an animated Action Figure Theater, which makes superhero figurines move. You thought Superman was stiff in the comics? You should see him in animated plastic. ▲

BAM

POW!

ZAP!

RAW DATA

SPAM

\$10 billion

The projected cost of spam email in 2003 to corporate America in lost productivity and increased IT budgets

Ferris Research

1% Percent of Google searches made from computers running Linux in December 2002



32,434

The number of malicious attacks on U.S. Web sites reported in 2002

mi2g

50%

Percent of health and financial advice sites that fail to provide information about the authority or credentials of people giving advice on their sites

Consumers International

28%

The share of holiday shopping budgets U.S. Internet users spent online in 2002, up from 22% in 2001

AMR Research

The Rise Of The Pop-up

Despite the fact that 78% of Internet users say that pop-up ads are the most irritating form of Internet advertising, publishers nearly tripled their use of the annoying format in 2002. According to NetRatings/AdRelevance, about 1.2 billion of the

buggers popped up in January 2002, but by September, they had propagated to 4.9 billion a month. GartnerG2 analyst Denise Garcia warns site owners that "consumers are making it very clear pop-up ads are 'very annoying.' Owners of online sites serving these ads

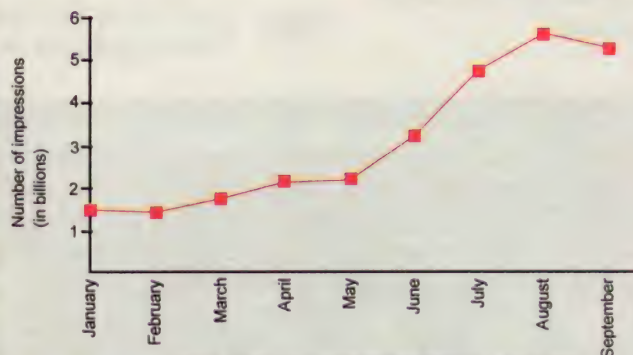
should consider stopping," before they alienate their own user base. But because pop-ups continue to get twice the click-through rates as banner ads and garner twice the ad rates, don't expect a cleaner desktop anytime soon. ▲



Find your
Classmates



Pop-up Impressions In 2002



Source: Gartner G2 and NetRatings/AdRelevance, October 2002

The Vanishing Console



Alex St. John was one of the founding creators of Microsoft's DirectX technology. He is the subject of the book "Renegades Of The Empire" about the creation of DirectX and Chromeffects, an early effort by Microsoft to create a multimedia browser. Today Alex is President and CEO of WildTangent Inc., a technology company devoted to delivering CD-ROM quality entertainment content over the Web.

A fundamental change is coming to the game industry: Consoles are becoming so powerful that they will cease to be relevant as gaming platforms. In the early days of video games, when sprite animation was state-of-the-art graphics technology, the console was the platform games had to be written for. The code for writing the game was so trivial that much of the value from the gaming experience was provided by the proprietary hardware. The hardware was also such a precious resource that game developers spent much of their coding energy optimizing their games to make the most efficient use of very limited computing resources. Today consoles are so powerful that many of their capabilities go to waste. Sure, each console has its own performance bottlenecks, but the consequence has been that game developers avoid these bottlenecks in order to make their games portable across console architectures; otherwise, they support the lowest common denominator platform with the widest distribution. Today, that's the PS2. The economics of game console distribution dictate that the lowest common denominator game console will almost always have the largest distribution because accumulating distribution takes time, and console architectures age very quickly.

The next generation of consoles will have such insanely vast computational capabilities that making content that takes advantage of them will be virtually impossible without an enormous investment in game engines and new tools. It's no good having 1-million-polygon super-realistic character models without a huge commensurate investment in facial animation, ultra-realistic motion, muscle deformation, hair and fabric physics, etc. Great-looking, million-polygon characters need to be placed in great-looking worlds, which have similar new authoring problems. In short, the next generation of games won't be about the console; they'll be about the tools and the engines and the companies that have them. Differences among game consoles will become like those among VCR brands. Sony and Optima VCRs play the same content; it's just a question of price and incremental features.

The PC industry went through a similar transition when modems were introduced. The first PC modem makers tried to differentiate their products and force consumers to buy their brand by making their

modems only work with other identical modems from the same manufacturer. As modem use became more common, modems increasingly became interoperable, but modem makers still tried to have a few "proprietary" features that worked best only when talking to other identical modems. Today modems are standardized, ubiquitous commodities. Many PCs don't even bother to ship physical modem hardware anymore; they run the modem on the CPU in software. Such will ultimately be the fate of the game console. The fact that game consoles are already sold at a loss is a clear indication that their entertainment value is not in the box but in the games they play. This trend will mean that standardized tools and game engines will increasingly be the dominant influence on game quality and features.

There was a time on the PC when there were no

standards for joysticks, video cards, and sound chips. PC games had to manually support each leading hardware manufacturer individually. This meant that most game developers spent the majority of their engineering cycles supporting inconsistent hard-

ware architectures instead of creating fun game play. The introduction of DirectX by Microsoft changed this dramatically. By standardizing the way games talked to gaming hardware, DirectX allowed game developers to focus on their content and hardware manufacturers to innovate and compete aggressively on the basis of features instead of market dominance. Today DirectX is, in essence, the standard game engine for most PC games and all Xbox titles.

There is little difference between having three competing video chip vendors making different 3D chips for the PC market and having three competing console vendors making different consoles for the TV. In the end, the consumer wants to play all the games available regardless of the box they require, and game publishers want to get their games to every consumer who wants them. One day consoles will become so powerful and difficult to utilize that the differences among them will be irrelevant. The console will become, like your VCR, a standardized commodity. ■

Differences among game consoles will become like those among VCR brands.

Anyone for a console VCR?

Send your feedback to TheSaint@cpumag.com.

EXTREME HARDWARE

These Gizmos Don't Sing It, They Bring It

Shedloads of Extreme Hardware. That's the promise of the typical Consumer Electronics Show, and 2003's CES delivered. Hy-Tek's Tek Panel 300 covers your need for a killer PC and a big flat-panel TV all at once, yet takes up zero floor space. Next, you can out-Spinal Tap Spinal Tap when you crank "Stonehenge" through your 7-foot Swans 2.2 speakers. And if you're too disoriented to find the stage afterward, at least you can capture your confusion for a future documentary with your Samsung Gadget camcorder.

by Marty Sems



Hy-Tek Tek Panel 300

Tablet PCs? Pfeh. Those are for wussies. It's Intel everywhere when a 2.4GHz, 533MHz front side bus P4 creeps into your widescreen TV. Combine most of your sedentary hobbies into one futuristic piece of furniture with the Tek Panel 300 from Hy-Tek (\$6,495; www.tekpanel.com). Start with a 30-inch WXGA LCD-TFT with a 176-degree viewing angle. Add Dolby Digital AC-3 audio support with Bose MediaMate starter speakers. Now mix in an ALL-IN-WONDER RADEON 8500DV, a DVD/CD-RW combo drive, and 120GB of PVR potential, plus a wireless keyboard and mouse for couch computing. Hang it on your wall as is or call Hy-Tek to customize a Tek Panel to your specs.



Swans Speaker Systems Swans 2.2

It's hard to enjoy your new Tek Panel 300 when you're tilted to one side. Pull your wallet out of your back pocket 'cause it's still much too fat. Hey, here's something that could utterly flatten it: \$68,000 speakers! Why the heck not? They'll look great flanking your Tek Panel, and they'll sound better than you deserve. Flap on over to www.swanspeaker.com to see the Swans 2.2, which apparently mate for life. At more than 6 feet, 8 inches tall, they're tall enough to roost on. Multiple ribbon tweeters and drivers, plus woofers with oversized voice coils, make these Swans stand out from the wedge. Sudden poverty is nothing when you're serenaded with your bank account's swan song—and sitting level once again.

Sony KLV-30XBR900

It's déjà vu in the TV aisle. Here's a 30-inch LCD that costs about \$6,000; sure sounds familiar. But unlike the Tek Panel 300 hybrid PC/TV, Sony's KLV-30XBR900 is a pure display. Using Sony's WEGA engine and 1,280 x 768 WXGA resolution, this pricey panel aims for brilliant clarity. The KLV-30XBR900 uses various technologies to boost the signal/noise ratio and reduce the number of lossy analog-digital conversions. Built-in speakers with TruSurround—now there's some irony for you—should tide you over until you can afford speakers that really do surround you. Peep more details on this flat boob tube at www.sonymstyle.com.



Samsung Electronics ITCAM-7

Samsung's "Gadget" camcorder, the ITCAM-7, is the first to use a hard drive instead of tape or optical disc (www.samsungelectronics.com). It also doubles as an MP3 player and a portable hard drive. Yeah, that qualifies the Gadget as "extreme" this month, but it leaves us with questions, such as the obvious: Why only 1.5GB? That's about the capacity of a single-sided 3-inch DVD-RAM and more than one hour of MPEG-4 in super fine mode, Samsung says. Still, there are far more spacious 1.8-inch drives out there. In any case, the Gadget's tiny size should help it compete, as should its low price of \$499, when it debuts in May. The Gadget comes with USB 2.0 and, weirdly, a Memory Stick slot. With the 1-inch Hitachi Global Storage Technologies (formerly IBM) Microdrive getting a revamp to 4GB this fall, wouldn't a CompactFlash slot have made more sense? It seems that for this gadget at least, Hitachi would have been a better influence for Samsung than Sony, we think.



Monte Carlo Game Room Lusso

Ante up, Aunty. It's casino night. The Lusso is a digital card game system for up to six players, plus a dealer. It's also a beautiful, handcrafted hardwood casino table that wouldn't look out of place in front of Agent Cooper and Big Ed at One-Eyed Jack's. A custom CPU deals Blackjack, Baccarat, and a game called Cardslots over seven active-matrix LCDs. If you wanna play, you gotta pay, but what's \$39,500 to a high roller like you? Cash your chips at Hammacher Schlemmer (www.hammacher.com) or another dealer (www.montecarlogameroom.com/dealers.html). And if you happen to encounter Joe Pesci at the table, try not to make him mad.

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⁶\$100 off digital video camcorder with purchase



\$499⁹⁹

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- Alphamagic Gradient Wipes
- Pinnacle Impression DVD Pro Authoring
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- Voice Mode for accentuating a person's voice over background noise
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- Six Programmed Auto Exposure Modes Including Full Manual
- IEEE 1394 FireWire and USB Terminals for complete compatibility
- Flexible 2.5" LCD Screen and Color Viewfinder



\$2599

Gateway 700x Digital Film Maker

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- 512MB PC800 RDRAM
- 128MB NVIDIA® GeForce4™ Ti4200G AGP Graphics with DVI and TV-Out
- 200GB storage (80GB and 120GB 7200RPM Drives)
- 17" LCD Flat Panel Display
- DVD-RAM/-R/-CD-RW Combo Optical Drive
- SoundBlaster Audigy Digital Audio Card
- Boston Acoustics BA745 Speakers and Subwoofer
- IEEE 1394 FireWire (4 pin in front panel and 6 pin in rear)
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- Integrated 802.11b Wireless Connectivity
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- Primary Lithium Ion Battery
- Microsoft® Windows® XP Professional Edition
- Digital Film Maker Bundle
- Pinnacle Digital Video Publishing Software Collection

1-Year Limited Warranty⁵ includes Tech Support, e-Support, In-Store, In-Home Factory Labor



www.gateway.com/digitalzone/video

AOL Keyword: Gateway

Advertised merchandise and in-store configuration may not be available at all store locations or through all sales channels. Prices and configurations subject to change without notice or obligation. Prices exclude shipping, handling and taxes (if applicable). Not responsible for typographical errors. ¹Maximum data transfer rate dependent upon multiple variables. ²Limited warranties and service agreements apply; visit gateway.com or call 1-800-846-2000 for a free copy. ³For more information about rebate offer, log onto www.gateway.com/rebate or call 1-800-846-4208. ⁴Performance may vary depending on the system configuration and software applications used. Copyright ©2003 Gateway, Inc. All rights reserved. Gateway Terms and Conditions of Sale apply. Gateway.com and Gateway Country Stores, LLC, are separate legal entities. Gateway, the Spotted G Gateway Logo, the Spotted G Logo, the Black-and-White Spot Design and "A better way." are trademarks or registered trademarks of Gateway, Inc. in the U.S. and other countries. The Intel Inside Logo, Intel and Pentium are registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries. Microsoft and Windows are registered trademarks of Microsoft Corporation. All other brands and product names are trademarks or registered trademarks of their respective companies. Ad: Arnell Group Ad Code: 112285

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- Movie Creator VCD/DVD
- IEEE 1394 FireWire (4 pin in front panel and 6 pin in rear)
- SoundBlaster Audigy Digital Audio
- Boston Acoustics BA745 Speakers with Subwoofer
- 56K V.92 Voice Modem¹ and 10/100 Ethernet
- Microsoft® Windows® XP Home Edition
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COMPUTER COUSINS

Are Macs & PCs Really So Different?

Not long ago it struck us that the street addresses for Apple's and Dell's corporate headquarters are strikingly similar. Dell's is One Dell Way, Round Rock, Texas; Apple's is 1 Infinite Loop, Cupertino, Calif. Coincidence? Maybe, but it's still spooky. We also noticed a few other similarities between Apple's Power Mac offerings and the current lineup

of Dimensions by Dell. So we set out to take a closer look under the hood of two recent best of breeds: Apple's Power Mac G4 Dual Processor and Dell's Dimension 8250.



Apple Power Mac G4 Dual Processor

COURTESY OF APPLE

Funky Openers

Apple and Dell have taken a unique approach in designing the cases for their top systems. To get inside the Power Mac, you pull a handle and pull the side panel downward, which makes the drive bays easily accessible and puts the motherboard flat on your desk. This saves the time we often spend tipping PC cases on their sides to work with a horizontal motherboard.

The Dimension is hinged on the front end; to enter its dark interior, you press a button on the case's top back end and then pull the chassis open like a book. This adds a fair degree of stability when working inside but diminishes elbow room and makes putting the case on its side unfeasible.



Dell Dimension 8250

Motherboard Mainstays

The Power Mac has a pair of PowerPC G4 1.25GHz processors. Apple, IBM, and Motorola jointly developed the CPUs. Two processors provide symmetric processing, which helps make the Power Mac an intense multitasker. Also onboard is one 512MB PC2700 DDR SDRAM module, with four additional slots available to add up to 2GB of memory. The Power Mac doesn't use any of its four 64-bit PCI slots out of the box.

An Intel 82850 chipset and a top-of-the-line 3.06GHz P4 with Hyper-Threading graces Dell's board. There are

two 256MB RIMMs for 512MB worth of dual-channel PC1066 RDRAM, upgradable to 1.5GB. Only one of the Dimension's four 32-bit PCI slots remains available.

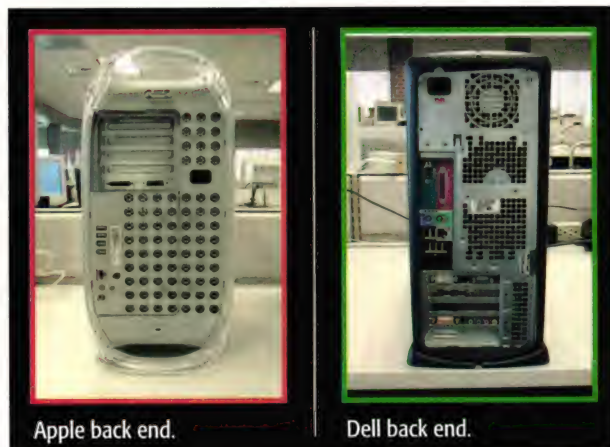
Power Trips & Fan Clubs

An AcBel 400W PSU powers the Power Mac. There's a side case fan and a fan in the case's bottom that's perpendicular to the processors when the case is closed. The dual PowerPC G4s sit beneath a colossal aluminum heatsink. The Dimension's PSU is weak by comparison at 250W, but it gets the job done. There are two fans in back (in addition to the PSU fan) and a vent to draw extra heat away from the CPU.

The Spinners

Both systems have high-performance Ultra ATA/100 hard drives spinning at 7,200rpm. The Power Mac uses a 120GB IBM Deskstar, while the Dimension has a capacious 200GB Western Digital drive. Both systems also strive to deliver optical drives fit for CD- and DVD-heads alike. The Power Mac includes Apple's own

SuperDrive, which combines lumbering 8X/4X/24X CD-RW and average-speed 2X/2X/6X DVD-R/RW capabilities in a single unit. The Dell uses two NEC drives: a combo CD-ROM and DVD+R/RW model and a zippy 32X/10X/40X CD-RW combined with a 16X DVD-ROM.



Apple back end.

Dell back end.

Graphic Differences

In the graphics department, Apple settled for a now-dated ATI Radeon 9000 Pro video card with 64MB DDR. This AGP 4X card has ADC and DVI ports. We hooked up an absolutely gorgeous 17-inch Apple Studio Display to the ADC port. The display doesn't have settings controls, but it doesn't need them. The card supports two displays, so if you have another Apple monitor and a DVI-to-ADC adapter, you can have twice the fun.

Mingus & Keanu

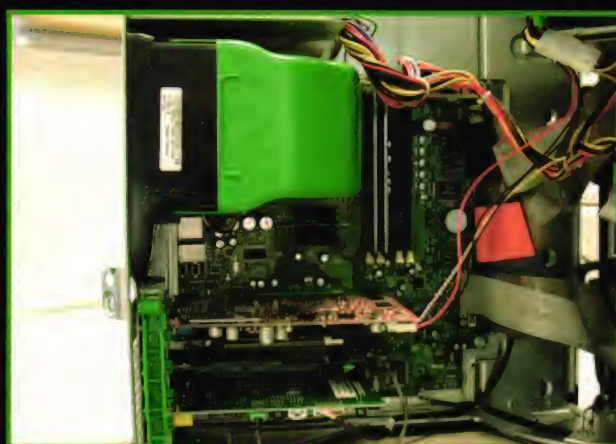
Lacking Apple-friendly benchmarks, we had to exclude the Power Mac from our system-benchmarking run. (See the "Parts Is Parts" chart with this article to see the Dimension's incredible performance in SYSmark2002 and Futuremark's 3DMark2001.) We did have Quake III Arena, though, and, well, there was a disparity between the systems (see the chart to see how much better the Dell did). The Power Mac's dual processors

Ghosts In The Machine

Ultimately, what most separates these systems (dual processors aside) is the OS. The Power Mac, of course, runs the Unix-based Mac OS X version 2.2, while the Dimension runs Windows XP Home Edition. As we've seen, each system has strong merits and a handful of limitations. But no matter how close PC power tweakers get to staring curiously across the /switch river and wondering what it would be like to buy a system that's



Apple top angle, case open.



Dell side view, motherboard.

The Dimension includes the cutting-edge ATI Radeon 9700 Pro, complete with VGA, DVI, S-Video, and TV-out ports. We used the DVI connector to install the Dell UltraSharp 1800FP, a sharp, vibrant 18-inch LCD.

Back Alley Connections

Both systems have ports galore, but the Power Mac remains firmly in USB 1.1 territory, while the Dimension goes USB 2.0 all the way. The Power Mac has six USB 1.1 ports; you need two to hook up the Apple USB Keyboard and Apple USB Mouse, but you gain another because the keyboard sports a one-port hub. The Dimension has eight USB 2.0 ports, including two under a lid on the front. You only need one to plug in the Logitech USB WheelMouse, as the keyboard is a standard PS/2 model. The Power Mac and Dimension each have two FireWire ports.

improve multitasking capabilities and therefore help reduce processor sweat when doing graphics editing, CAD work, and such, but you just can't beat the Dimension's Radeon 9700 (today, at least) for 3D performance.

Benchmarks aside, we popped in a Charles Mingus CD and "The Matrix" on DVD to get a handle on the systems' multimedia performance. Both fared equally well in the graphics category, with sharp DVD playback and no flicker. The displays were bright enough to not lose sight of objects in shadowy scenes but were on key enough to avoid washing out brighter images. The viewing angles were also excellently wide on both displays. Mingus sounded much better coming out of the Dimension's THX-certified Dolby SurroundSound 6.1-channel Altec Lansing speakers. Sorry, Apple, but a pair of Apple Studio speakers only works until you want to close your eyes and pump up the volume.

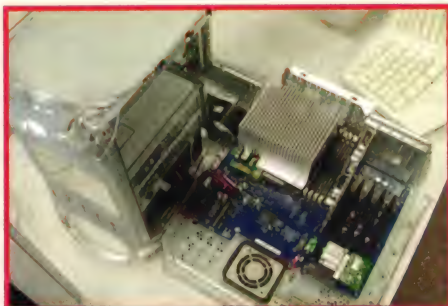
already running a Unix variant, so few actually take the plunge and convert. And frankly, Apple power users tend to be cat-like in their disinclination to spending time hovering about a PC, no matter how intriguing it might be because, well, why bother? Apple lovers remain so, and PC lovers tend to remain so, as well.

In the end, pricing may play the largest role in keeping PC users away from Macs. However, the price for the G4 configuration we looked at has come down from \$4,298 (\$3,299, plus \$999 for the display) in late 2002 to \$3,007 (\$2,308, plus \$699 for the same display). That's just \$8 more than the Dell's \$2,999 price tag. At this rate, PC power users who are actually Unix/Linux addicts in disguise should take a much harder look at the big Apple. **CPU**

by Cal Clinchard

Parts Is Parts

We didn't set out to pit the Power Mac G4 Dual Processor and the Dimension 8250 against each other in head-to-head fashion, but we'd be remiss if we didn't give you the side-by-side rundown of components and benchmarks. So here she is. Pricing is current as of press time and includes the displays.



Apple Power Mac G4 Dual Processor



Dell Dimension 8250

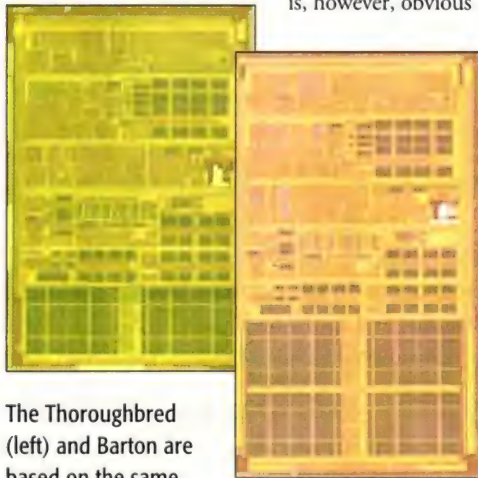
Chassis	Apple's own	Dell's own
PSU	AcBel 400W PSU	250W PSU
Chipset	Apple KD23603TANFGA	Intel 82850
Processor	PowerPC G4 (2)	Intel Pentium 4
Clock Speed	1.25GHz each	3.06GHz
L2 Cache	256KB for each processor	512KB
L3 Cache	1MB DDR SDRAM for each processor	N/A
Bus Speed	167MHz	533MHz
Memory	512MB PC2700 DDR SDRAM	512MB PC1066 RDRAM
Memory Slots	4 DIMM slots (3 available)	4 DIMM slots (2 available)
Hard Drive	120GB IBM Deskstar	200GB Western Digital
Optical Drive #1	Apple SuperDrive combination 8X/4X/24X CD-RW and 2X/2X/6X DVD-R/RW	NEC 2X/2X/6X DVD+RW
Optical Drive #2	N/A	NEC combination 32X/10X/40X CD-RW and 12X DVD-ROM
Floppy Drive	N/A	1.44MB Floppy Drive
Network Adapter	10/100/1000BASE-T Ethernet (integrated)	Intel Pro 10/100 Ethernet (integrated)
Modem	56Kbps V.92 modem (integrated)	56Kbps V.90 modem (integrated)
Video Card	ATI RADEON 9000 Pro	ATI RADEON 9700 Pro
Video Memory	64MB DDR	128MB DDR
Video Ports	ADC; DVI (DVI-to-VGA adapter included)	VGA; DVI; S-Video; TV-out
Monitor	Apple Studio Display	Dell UltraSharp 1800FP
Monitor Size & Type	17-inch LCD	18-inch LCD
Monitor Resolution	1,280 x 1,024 (maximum/optimal)	1,280 x 1,024 (maximum/optimal)
Monitor Refresh Rate	70Hz (unchangeable)	80Hz (maximum)
Audio Card	N/A (integrated)	Santa Cruz Voyetra Turtle Beach
Audio Jacks	3 minijacks: 1 speaker, 1 audio in, 1 microphone	3 minijacks: 1 speaker, 1 headphone, 1 microphone
Speakers	Built-in speaker; 2 Apple Pro stereo speakers	Altec Lansing THX Certified ADA-995 Dolby Digital Speakers (5) with Subwoofer
AGP Slot	1 AGP 4X (0 available)	1 AGP 4X (0 available)
PCI Slots	4 64-bit 33MHz PCI slots (4 available)	4 32-bit PCI slots (1 available)
3.5-inch Drive Bays	4 3.5-inch bays (3 available)	4 3.5-inch bays (2 available)
5.25-inch Drive Bays	2 5.25-inch bays (1 available)	3 5.25-inch bays (1 available)
Ports	6 USB 1.1; 2 FireWire	8 USB 2.0; 2 FireWire
Keyboard	Apple USB Keyboard	Microsoft Natural PS/2 Keyboard
Mouse	Apple USB Mouse	Logitech USB WheelMouse
Operating System	Mac OS X version 10.2	WinXP Home Edition
Bundled Software	Includes: AppleWorks; iCal; iChat; iMovie; iPhoto; iTunes; Internet Explorer	Includes: CyberLink PowerDVD; Dell Picture Studio Image Expert; Microsoft Office XP; Roxio Easy CD Creator 5; Sonic MyDVD
SYSmark2002 Internet Content Creation	N/A	402
SYSmark2002 Office Productivity	N/A	188
SYSmark2002 Total Score	N/A	275
3DMark2001 Score	N/A	15,187
Quake III Arena (1,280 x 1,024)	72.3fps	265.7fps
Quake III Arena (800 x 600)	88.9fps	304.1fps
Price	\$3,007	\$2,999
Manufacturer	Apple	Dell
Toll-Free Phone	(800) 692-7753	(888) 799-3355
Phone	(408) 996-1010	(512) 338-4400
URL	www.apple.com	www.dell.com

AMD Athlon XP 3000+



By year's end 2002, the Athlon XP was no longer the top performer in the market. Intel's Pentium 4 3.06GHz was not only outpacing the XP in performance, but with price cuts, Hyper-Threading, and a smooth transition to 0.13-micron, Intel was also able to offer its processors at a competitive price. AMD enthusiasts were hoping a couple of saving graces would change that: First, the introduction of Hammer 64 and second, the interim Barton core to tide things over. Neither happened as planned.

The Hammer 64 is now delayed until September 2003, but on the plus side, the Barton core has finally appeared. Based upon AMD's 0.13-micron process, the Barton core one-ups the outgoing Thoroughbred core by doubling the all-important L2 cache to a hefty 512KB. Other than that, the two cores remain markedly the same. The difference is, however, obvious



The Thoroughbred (left) and Barton are based on the same 0.13-micron process, but Barton has more transistors, a bigger die size, and a larger L2 cache.

when you make a side-by-side visual comparison: the extra L2 cache sticks out as more transistors pack the die (up from 37.6 million to 54.3 million), increasing size from 84mm² to 101mm² and adding a little more bling to the package. This actually makes for quite a hefty core and doesn't help AMD's cause by driving up manufacturing costs, as well as upping heat dissipation. So expect to pay a little more than you're used to if you're a regular AMD user.

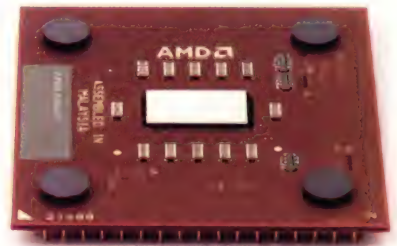
The FSB is still set to 333MHz, although once the clock speeds are upped, AMD has hinted that 400MHz will not only be more beneficial but more

of a reality. However, the model rating is a little mystifying this time around. The top dog Athlon XP 3000+ that came in for review is clocked at 2.166GHz. Now think back to the T-bred-based Athlon XP 2800+ (December *CPU*, page 18); it was clocked higher at 2.25GHz. This apparently gets all smoothed out due to the Barton's extra L2 cache offsetting things, or some jiggery-pokery like that, anyway. Because the 2800+ was a limited production chip and more often than not dubbed a paper release, most of you will likely not have been affected anyway. Forget it ever existed and instead just use the helpful chart on the right from AMD ("AMD's Model Rating System"). It shows off AMD's "newly invigorated" model rating system that Uncle Albert has learned to love.

As you can see from the benchmarks, Uncle Albert needn't worry: The XP 3000+ actually better the P4 3.06GHz in some cases, whereas the reverse is true in others. AMD hasn't exactly grabbed the performance crown back from Intel, but it has caught up and made it a race too close to call. Close enough to prompt a response out of Intel? The next-generation Prescott core is still a ways out, so a nippier P4 will most likely be Intel's response. Just don't expect the same level of MHz cranking as last year; it seems both AMD and Intel are reaching the ceilings with their respective cores. New platforms (aka chipsets) will play an important role this time around, which means if you own either of the two top-dog CPUs, you will do well to hold on to them.

As I stated earlier, the XP 3000+ production costs make it pricey at \$546 and voids AMD's old price advantage (commonly known as "bang for your buck" in these parts) over Intel and its P4 lineup. It's a good thing that the performance is more than up to snuff, making it just as attractive as the P4 3.06GHz. You could always save a buck or two and opt for the Athlon XP 2800+ (2.083GHz) or Athlon XP 2500+ (1.833GHz), which are also based upon the Barton core. The choice is yours. . . . ▲

by Alex "Sharky" Ross



Athlon XP 3000+

\$546
AMD
(800) 538-8450
www.amd.com



AMD's Model Rating System

Product Name	Clock Speed
Barton 3000+	13*166MHz = 2.167GHz
Barton 2800+	12.5*166MHz = 2.083GHz
Barton 2500+	11*166MHz = 1.833GHz

Barton Benchmarks

	Athlon XP 3000+	P4 3.06
SYSmark2002	266	304
Content Creation	331	431
Office Productivity	213	215
3DMark2001 SE Build 330 (1,024 x 768)	15736	15627
Jedi Knight II 1.04 (640 x 480)	172.1	176.2
Quake III 1.07 Demo001 (640 x 480)	316.6	357.8
Serious Sam SE Grand Cathedral Demo (640 x 480)	112.5	101
Comanche 4 (640 x 480)	56.35	60.33
PCMark2002		
CPU	6686	7576
Memory	5848	8007
HDD	630	623



First Look

FIC ICE-Cube IC-VG61



ICE-Cube IC-VG61

\$220

FIC

www.fic.com.tw



Hand it to FIC: Standing on the shoulders of Shuttle's XPC is slippery work, but FIC's ICE-Cube takes the XPC design, improves it, adds more style, and then drops the price.

Beautiful . . .

Yes, brushed metal looks cool. But take the XPC's brushed metal exterior, coat it in half-inch-thick plates of clear plastic, and the result is striking. FIC bolts on a clear/silver, hour-glass-shaped, convex handle for easier hauling to LAN parties. The transparent panes make the sleek metal and LED highlights on the front plate seem to pop, but the clear sides also give you a look into the ICE-Cube's innards. Most notable is the translucent heatsink fan and its blue LED accents.

Particularly in SFF designs, board-level feature placement is critical. A peek in ICE-Cube's left panel shows the single PCI and AGP slots, a thin aluminum heatsink clipped onto the i845GE north bridge, and the edge of your DIMM modules. One thing you don't see much of is wires.

The faceplate LED and power wires are located right behind the front panel so that the wires can be tightly bundled and kept out of sight. If you omit a floppy drive, most of the data and power cables can be bundled and stuck into this empty spot inside the drive cage. In fact, the only cable that seems obtrusive from this view is the CD-Audio wire running to the board from the optical drive.

The right-side view isn't quite as clean. The ATX power connector and your data cables are there in your face, but at least you have a better look at that sexy CPU fan.

More subtle touches such as mounting the CMOS battery on its edge to save on board space. Another thoughtful innovation is the front panel jack cabling. Whereas the XPC shares these among several beige and gray cables snaking to various spots on the mobo, FIC combines the wiring for SPD In, Rear Out, Center/Bass, Mic In, two USB ports, and the PS/2 ports for mouse and keyboard into one black cable that mostly hides below the motherboard along the right panel.

. . . And Beastly

The ICE-Cube is quiet, but not very quiet. After all, you need that voluminous CPU

heatsink/fan for the latest Pentium 4 chips. Then there's the power supply. We miss the XPC's innovative heat pipe design, but FIC does something perhaps just as smart. Immediately below the power supply is a wide, cylindrical fan that spans nearly from the right edge of the motherboard to the PCI slot. This doesn't necessarily channel air right off the CPU, but it does sweep in air from across the board.

Obviously, any serious gamer will plug in a hotrod graphics card. (Watch for FIC to bundle the ICE-Cube with high-end RADEON cards.) FIC also integrates S-Video and composite video output, which will be welcome news to anyone planning to make the ICE-Cube into a personal video recorder. OK, we concede that it might make a killer corporate presentation machine, too.

In back, the ICE-Cube additionally features two 1394 ports and a LAN jack, as well as each of the jacks replicated on the front panel except for the PS/2 ports.

The Verdict

FIC's ICE-Cube is sturdily built, brimming with intelligent design (did we mention the pair of vibration-dampening strips between the cylinder fan and the case?), and an unbelievable bargain at only \$220. ▲

by William Van Winkle

Specs & Scores

With a 2.8GHz Pentium 4, a 40GB IBM Deskstar, and a pair of 256MB DDR333 DIMMs, we ran the system at 800 x 600 x 32 and pulled in the following scores

3DMark2001 SE	1748 (at 1,024 x 748 x 32)
Quake III	103.5fps
Jedi Knight 2	60.3fps
PCMark2002	
CPU	6845
Memory	5614
HDD	942

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

Seagate Barracuda Serial ATA V 120GB

The first Serial ATA 150 hard drive is a Seagate: the quick and quiet Barracuda V. We're still waiting for an apples-to-apples comparison between the SATA and parallel ATA interfaces in identical drives because the 120GB 7,200rpm ST3120023AS has an 8MB cache instead of 2MB like the ATA/100 Barracuda ATA V.

Using a PC with a 1.8GHz P4, 512MB of PC800 Rambus, an ASUS P4TE mobo, and WinXP Pro, we tested the SATA Seagate with three adapters. Although the drive's Winbench99 results varied by adapter, its HD Tach 2.61 scores looked very similar. These peaked with a 13.4ms random access time, a 36.5MBps average read rate (44.6MB maximum), and a 29.8MBps average write rate (40 maximum).

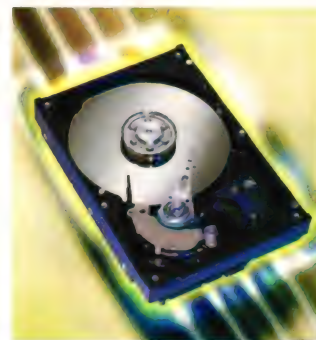
A Silicon Image PB3112A adapter (SiI 3112 chip) gave the best Winbench99 performance after a driver update to version 10035. Using this adapter, the SATA V hit cosmic scores of 23,600KBps Business Disk and 36,500KBps

High-End Disk. This Barracuda's 8MB cache helped here. Seagate also says SATA packetizes data more efficiently than PATA.

Next up was a SIIG adapter, SC-SAT212 version 1.0, also based on the SiI 3112 chip. Demonstrating the importance of driver updates, the SIIG topped out at just 12,400KBps Business Disk and 32,400KBps High-End Disk. Finally, a Promise SATA150 TX2plus adapter using the Promise PDC20375 chip (driver version 1.00.0.14) fell into the middle with 15,600KBps Business Disk and 36,300KBps High-End Disk results.

Such unearthly Winbench scores gave me pause, but Seagate confirmed that its results resemble ours. SATA should be available in half of new hard drives by summer or fall of 2004, the company quotes analysts as saying, and we'll have to wait a year or two before SATA takes hold in optical drives and other ATAPI devices. ▲

by Marty Sems



Barracuda Serial ATA V 120GB

\$199

Seagate

(800) 732-4283

(831) 438-6550

www.seagate.com



SIIG SC-SAT212 Serial ATA Adapter

SIIG announced its Serial ATA 150MBps adapters ages ago, but until recently, there were no native SATA hard drives to use as test mules. Seagate ended our suspense with the Barracuda Serial ATA V 120GB and arranged for us to receive three SATA adapters: a SIIG SC-SAT212, a Promise SATA150 TX2plus, and a Silicon Image SiI PB3112A. The SIIG won the fashion award of the trio, but its test results were a different story.

We installed the SIIG in a PC with a 1.8GHz P4, 512MB of PC800 Rambus, an ASUSP4TE mobo, and WinXP Pro, along with the Barracuda SATA V. The drive's HD Tach 2.61 scores looked nearly uniform from all three adapters. Using the SIIG adapter, the Seagate logged a 13.6ms random-access time, a 36.5MBps average read rate (44.6MB maximum), and a 29.6MBps average write rate (40.0 maximum).

Those sustained read and write rates look pretty much like those of the parallel ATA

Barracuda V. However, a combination of an 8MB cache and SATA's technical improvements elevated this drive's Winbench99 scores. The SIIG/Seagate duo's 12,400KBps Business Disk and 32,400KBps High-End Disk scores look awesome in a vacuum.

Unfortunately, the downer is that these WinBench99 ratings trail the Silicon Image and Promise adapters' scores by about 3,000 to 11,000KBps. This is a striking discrepancy, as the SIIG uses the same Silicon Image 3112A chip as the bakeoff-winning Silicon Image card. I should mention that the Silicon Image adapter benefited from a few last-minute driver updates to take the speed crown. As of this writing, the SIIG's drivers posted online were three months old, so don't write off the SIIG card while the drivers are still in flux.

The SIIG comes with SATA data and power cables, instructions, and a five-year warranty. ▲

by Marty Sems



SC-SAT212 Serial ATA Adapter

\$49.99

SIIG

(510) 657-8688

www.siig.com





SATA150 TX2plus Serial ATA Adapter

\$52

Promise Technology
(408) 228-6300
www.promise.com



Promise SATA150 TX2plus Serial ATA Adapter

Promise Technology is an old hand at parallel EIDE adapters, but it's certainly not going to miss the Serial ATA party. Its entry-level SATA150 TX2plus adapter uses Promise's own PDC20375 chip.

The TX2plus is a little unusual in that it not only gives your system two 150MBps SATA ports, but it also provides an UltraATA/133 port. Like all SATA adapters I've seen so far, the Promise supports 48-bit LBA, so hard drives bigger than 137GB won't be a problem. Promise also sells a four-port Serial ATA-only card.

We plugged the TX2plus and a Seagate Barracuda Serial ATA V 120GB into a system with a 1.8GHz P4, 512MB of PC800 Rambus, an ASUS P4TE mainboard, and WinXP Pro. The Promise card seemed to freak out HD Tach 2.61, but I've noticed that's not hard to do. Using driver version 1.00.0.14, the TX2plus let the Seagate chart a 34.9MBps average and a 42.9MBps

maximum read rate. The rest of HD Tach's results were suspect, to put it mildly.

The Promise card's Winbench99 scores looked more down-to-earth but still amazing compared to the typical results this benchmark reports for EIDE drives. Its 15,600KBps Business Disk and 36,300KBps High-End Disk ratings fell short of the Silicon Image PB3112A adapter's results (23,600KBps Business Disk and 36,500KBps High-End Disk), but still look very healthy. The SiI card's performance leap after a driver update tells me not to make any grand judgments on which adapter is king while SATA is still a young interface.

The TX2plus comes with a two-year warranty, which doesn't look so hot next to the SiIG SC-SAT212's five-year warranty. However, it supports Red Hat and SuSE 7.3 and 8.0, as well as Win98/Me/NT4/2000/XP. ▲

by Marty Sems



i2eye Videophone

\$299

D-Link
(800) 326-1688
www.dlink.com



D-Link i2eye Videophone

The new D-Link i2eye Videophone attracted a lot of attention in the labs (computer techs are always excited for new toys), so the Videophone received a lot of testing time. We didn't find any flaws with the new device, although you'll want to keep in mind that the Videophone ties up your phone line.

Setup is simple: Connect your home telephone and television or computer to the Videophone via your Internet connection's Ethernet cable. You'll need to have your IP address handy during initial setup. Instead of phone numbers, the Videophone uses IP addresses to call fellow users. However, because IP addresses often change, you will assign yourself a 10-digit phone number that will represent your IP address. This saves you from the hassle of keeping track of a changing IP address.

You have the option of speaking through the phone or using a speakerphone device installed on the Videophone. On speakerphone, voices

had a bit of an echo, but nothing out of the ordinary for a speakerphone. At 30fps on a fast connection, I experienced minimal frame loss. Likewise, 352 x 288 resolution gave me a decent image that came across clear and defined.

A remote control is included in the package, so you can use the Videophone just as you would your television. Additionally, you can hook up your Videophone to the VCR and record any calls you want to.

For privacy, D-Link includes a built-in caller ID function, options to turn off the video or audio portion of the Videophone, and a Do Not Disturb mode that you can activate easily with the remote.

At \$299, the Videophone is definitely a high-priced toy, but if you really need such a device, the money will be well-spent. ▲

by Mary Lafferty

Gigabyte GV-R9500

The GV-R9500 is a midlevel card that's more powerful than Gigabyte's GV-R9000 PRO, yet less expensive than the top-of-the-line GV-R9700 PRO.

The GV-R9500 uses ATI's Radeon 9500 GPU and has a core clock speed of 275MHz with an effective memory clock of 540MHz. The board we tested uses 64MB of Hynix DDR SDRAM at 3.6ns. This is an 8X AGP card, of course, and it supports DirectX 9 and OpenGL. The GV-R9500 is compatible with Win9x/Me/2000/XP.

The GV-R9500 is clearly designed to compete with similarly priced GeForce4 Ti 4200 video cards. The card's 3DMark2001 SE score of 9,134 is a bit higher than similarly priced NVIDIA cards, but the GV-R9500 didn't fare quite as well as the average NVIDIA card during our Quake III tests. At 800 x 600, the GV-R9500 posted a frame rate of 203.8fps—about 10 to 20 frame per seconds less than most Ti

4200 cards I've seen. At 1,024 x 768, the frame rate dipped to 183.6, again a little slow. The frame rate dropped precipitously at 1,600 x 1,200 to 75.5fps. Of course, that's still more than sufficient for smooth gameplay.

I ran the Serious Sam tests next, and again, the GV-R9500 scored a little lower than most Ti 4200 cards. In the Karnak demo, the GV-R9500's frame rate was 76.5fps at a 1,600 x 1,200 resolution. The card posted 73.1fps during the Metropolis demo at the same resolution.

I've had a preference for Ti 4200 video cards since they came out last year, and I don't think the GV-R9500 will convince me to change my point of view (although I do love the Radeon 9700-based cards). Still, it's nice to have a non-NVIDIA based video card available for the midlevel market. I'm just not convinced the Gigabyte card is the one to buy. ▲

by Michael Sweet



Gigabyte GV-R9500

\$140

Gigabyte

(626) 854-9338

www.giga-byte.com/index.html



Sony SDM-X72

The market is getting crowded lately with high-quality 17-inch and larger LCDs, and Sony's recent entry fits right in. Sony released the 18-inch SDM-X72 along with its sibling, the 15-inch SDM-X52. Both displays share similar features, including decent-sounding stereo speakers, super-sharp imaging, bezel, and overall design. The main differences are that the SDM-X72 is, of course, larger and it accepts dual (analog and digital) input. (The SDM-X52 is analog-only.)

I tested the SDM-X72 at its maximum/native 1,280 x 1,024 resolution and a 60Hz refresh rate, using DVI input and Display-Mate's Multimedia Edition diagnostic software, and was impressed with the monitor's overall performance. Highlights included a perfect 100 video bandwidth index (meaning that the display's horizontal and vertical frequencies are evenly matched), excellent clarity when displaying focus and resolution test screens, and no halo effects or stuck pixels.

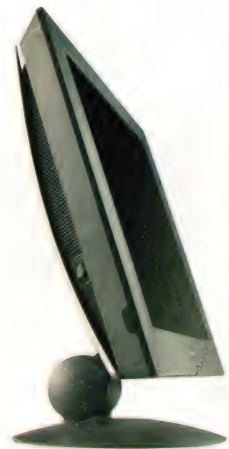
The SDM-X72 displayed vibrant, on-key colors but didn't handle DisplayMate's extreme

grayscale test screen as well as it could have. Overall darkness was the problem, and it required adjusting the contrast to 90 from its factory setting of 70; however, there was still some over darkness, with half of the dark shades appearing black.

Practical testing revealed no hint of a grayscale problem, with high-resolution images looking superbly clear and realistic and text looking razor-sharp at every size. The display also worked well as a television (for that I used our test PC's TV tuner card; the SDM-X72 doesn't include a TV Tuner) and looked great even at extreme viewing angles.

The display weighs 15.7 pounds, consumes a maximum 32 watts of power, works with Windows and Mac OSes, and comes with all the necessary cables (DVI-D for digital input, HD15 for analog input, and an audio cable). It sports a reasonable \$749 price tag, but you can find it for less online; at press time, Sony was offering a \$50 mail-in rebate. ▲

by Cal Clinchard



SDM-X72

\$749

Sony Electronics

(800) 571-7669

(201) 930-1000

www.sonystyle.com



Lite-On CD-ReWriter LTR-52246S 52X/24X/52X



CD-ReWriter LTR-52246S 52X/24X/52X

\$89

Lite-On

(408) 935-5353

www.liteonit.com



Paying less than 90 bucks for one of the current best CD burners feels a little naughty. It's clear CD-RW drives are headed toward commodity status. Even if you've moved on to a good DVD burner, it still makes economic sense to cut your CD-Rs in a faster, cheaper drive. It's also smart to put the wear and tear of spinning game and application discs on a fast CD drive rather than on your pricier rewriteable DVD drive.

Lite-On's LTR-52246S 52X/24X/52X came my way awhile back dressed as CenDyne's Lightning V, so I didn't expect many surprises from the Lite-On. It supports the drag-and-drop Mt. Rainier CD-RW format (CD-MRW) and uses SMART-BURN buffer underrun prevention. Its SMART-X technology, meanwhile, is supposed to adjust the spindle speed for more satisfactory audio and video ripping and playback.

We tested the Lite-On in a WinXP Pro PC with a 1.8GHz P4, 512MB of PC800 RDRAM, and an ASUS P4TE motherboard. The drive

topped out at about 49.8X read speeds in four out of five CD Tach 98 2.05 passes (7,464KBps maximum; 5,529KBps average). A slightly slower initial pass dropped the drive's overall average read speeds to 7,261KBps maximum and 5,332KBps average (31X weighted average drive rating). The same thing happened with the CenDyne version, incidentally.

In the more practical tests, CD-R and CD-RW disc creation with folders of mixed file types, this Lite-On trailed its CenDyne incarnation by about 30 seconds for both types of disc. It wrote 700MB to CD-R in an even 3:00 (minutes:seconds) and 639MB to CD-RW in 5:19. That's another oddity, as we tested the CenDyne on a slower 1GHz PIII system with 100MHz SDRAM. Go figure.

This drive comes with Nero 5.5.9.13. It's a terrific value. ▲

by Marty Sems

Creative Inspire 6.1 6600



Creative Inspire 6.1 6600

\$129.99

Creative Labs

(408) 428-6600

(800) 998-1000

www.americas.creative.com

/welcome.asp



Is there such a thing as too many channels of crisp, clear audio for your PC? Not if you're Creative Labs. The company's new Audigy 2 sound card can handle up to seven channels of audio. You can't have a seven-channel sound card without seven-channel speakers. Enter the Creative Inspire 6.1 6600, a 6.1 channel speaker system that will surround your PC with luscious sound.

The system consists of five satellite speakers, one center channel speaker, and one subwoofer. The satellite speakers and the center channel measure 4 inches high x 3.5 inches wide x 6.25 inches deep. The satellites are 8 RMS watts each, and the center channel is 20 RMS watts. The subwoofer is only 22 RMS watts, giving the system 82 RMS watts (120 watts peak power) of total power. The sub is 10.5 inches x 9.5 inches x 9.5 inches. A seven-channel speaker system deserves a heftier subwoofer, but the sub still does a decent job of playing the lower frequencies. The system's frequency response is 40Hz to 20KHz.

I ran the usual tests on the speakers and listened to a few audio tracks, a few scenes from a DVD movie, and a few rounds of our test games. The audio tracks sounded excellent in 6.1 mode. The tunes were crystal clear and had good depth. The DVD movie also sounded nice, although the bass frequencies weren't quite as pronounced as I'd like.

We don't have any games that support seven-channel audio (as far as I know, there aren't any). Instead, I ran the test game in 4.1-channel mode. The satellite speakers sounded fine, but the bass was a little light. I like a sub that shakes my chair when I play games, and this one does not quite do that.

I wouldn't recommend this system for gamers until a good selection of games supporting this many channels are available, but audio-ophiles will appreciate the extra channels the system provides. ▲

by Michael Sweet

What
does your PC say
about YOU?



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HP PSC 2210



PSC 2210

\$399
Hewlett-Packard
(800) 752-0900
(650) 857-1501
www.hp.com



HP products are always strong competitors for a position in my Top 5 list of multi-function devices. This time around, the PSC 2210 made it—easily. Encompassing faxing, scanning, printing, and copying abilities, there isn't much the PSC 2210 can't handle.

I started my testing with the scanning features, and I was thoroughly pleased. Not only were scanned images clear, defined, and true to color, but the scanning options were the best I've seen on an MFD. The maximum optical scanning resolution is 1,200 x 4,800 dpi. HP offers its full scanning software, giving you the option of basic or advanced features and letting you scan to alternate programs.

Copying options offer eight preset size choice, or you can set your own. Color copies averaged about 1 minute to complete, and black-and-white copies took a mere 27 seconds—not too bad for an inkjet device.

Printing produced definite, clear-cut images that showed a good mixture of color. The maximum resolution is 1,200 x 1,200 dpi for color and

black-and-white prints. The quality of prints was equal to that of the Canon MultiPASS F20, which currently holds the top spot on my top five list.

Print times were better than decent. A 10-page text file printed in 1:15 (minutes:seconds), a high resolution graphic in 4:57, a six-page graphic-and-text file in 3:03, and a three-page PowerPoint presentation in 1:36.

HP included two digital camera card readers, letting you print directly from your camera without the assistance of a computer. You can print a proof sheet that displays thumbnails of all the images on the camera, and you can use it to select the photos you want to print and at what size.

If you're in the market for an MFD, check out the PSC 2210. For that matter, if you're in the market for a printer, copier, scanner, or fax machine, check out the PSC 2210 and seriously weigh your options. Is it better to pay about \$150 for each peripheral or \$399 for one that does it all? ▲

by Mary Lafferty

Y-E Data Hexa Media Drive



Hexa Media Drive

\$47.95
Y-E Data
(847) 887-7540
www.yedata.com



YE-Data's Hexa Media Drive is a pocketable, "6-in-1" flash memory card reader/writer. It's a USB 1.1 unit that supports the major card formats used today, including Type I and II CompactFlash, SmartMedia, Memory Stick, MMC (MultiMediaCard), and SD (Secure Digital).

The Hexa also supports the IBM Microdrive 1-inch hard drive, but there's no mention of support for new flash formats, such as RS-MMC (Reduced Size MultiMediaCard), xD-Picture Card, and Memory Stick Pro. YE-Data would only reveal that it is still working on support for new cards. In addition, Y-E Data qualifies its Memory Stick claim with a footnote that reads, "Copyright-protected files not supported." So, MagicGate Memory Stick owners, take note.

The Hexa is completely bus-powered and has no provision for an AC adapter. It comes with an A-to-B USB cable, a quick start guide, and a

driver CD. The reader has four activity/status LEDs, three of which correspond to its three card slots.

The reader looks fine sitting on a desk, but it is so light it slides around very easily. That's actually a blessing for notebook users, though, as the Hexa slips easily into a pocket.

We copied some folders of mixed file types to a CompactFlash card in the Hexa to give you an idea of its typical transfer times. From a system with a 1GHz PIII, 384MB of SDRAM, WinXP Pro, and a Quantum Ict20 20GB hard drive, the Hexa saved 25MB in 2:05 (minutes:seconds) and 50MB in 4:00. Transfers back to the hard drive took 0:32 and 1:05, respectively.

The Hexa pretty much covers the cards you're likely to use in the next six months, and it's inexpensive enough that you won't feel bad if you have to buy a supplemental card reader later on. ▲

by Marty Sems

Velocity Micro Gamer's Edge

Looking for a made-to-order high-end system that provides intense gaming performance yet isn't housed in a tower that's baked like a new Mustang or looks like it was tinkered with by Satan's elves? Check out the Gamer's Edge, a truly awesome system from decade-old Velocity Micro.

Specifications. The Gamer's Edge has the latest and greatest of almost everything, starting with an ideal-for-gaming ASUS P4T533-C motherboard. There's an Intel 82850 chipset onboard with the new 3.06GHz Pentium 4, which has a 533MHz bus speed and 512KB of L2 cache. Two 512MB RIMMs add up to 1GB of total RDRAM memory.

Velocity Micro packed in two IBM Deskstar ATA/100 7,200rpm hard drives in a RAID configuration for 180GB of disk space. There are two optical drives that offer solid performance: a TDK VeloCD 4800B CD-RW drive that writes at 48X, rewrites at 16X, and reads at 48X; and a 16X Samsung SD-616T DVD-ROM drive. There's also the obligatory 1.44MB floppy drive.

The system is a multimedia powerhouse, with audio/video components that would cost \$1,726 retail if purchased separately. This includes an ATI RADEON 9700 PRO video card (an AGP 8X card with 128MB DDR video memory and DirectX 9.0 support), a Sony Trinitron CPD-G520 monitor (a dual-input 21-inch CRT with a maximum 2,048 x 1,536 resolution and a low 0.24mm dot pitch), a Sound Blaster Audigy 2 sound card, and Klipsch ProMedia 5.1 Digital Dream Multimedia System THX-certified speakers (including an 8-inch subwoofer, center channel speaker, and four satellites).

An integrated Intel Pro 100 VE network adapter provides connectivity. For input there's a PS/2 Mitsumi keyboard and a USB/PS/2 Microsoft IntelliMouse. USB devices can plug into any of the system's eight USB ports; there are four USB 1.1 and two USB 2.0 ports in back, plus two USB 2.0 ports in front. Other ports include two serial, one parallel, and one FireWire, all in back.

The Gamer's Edge runs WinXP Home Edition, and the software bundle includes Ahead's Nero Express, CyberLink's PowerDVD, Soldier of Fortune II: Double Helix, and Hitman 2 Silent Assassin. A three-ring binder contains everything you'll need to help use, troubleshoot, and upgrade the system, including users manuals

for every component, system restore discs (one 3.5-inch floppy and three CDs), drivers, and Velocity Micro information.

Design. I appreciated the system's design, which is simultaneously utilitarian and good-looking. A side window lets you see the neon lighting and the blue Zalman Air Duct that funnels hot air up and away from the vertical CPU. A thermometer sensor inside and an LED display on the bottom-front of the case let you monitor the CPU temperature. Individual lids cover each optical drive so they open and close automatically, relieving you from having to open and close a case-front door (my only gripe here is that the drives are unmarked, but system owners will, of course, quickly memorize which is which).

Although not a tool-free endeavor, there's plenty of upgrading opportunities inside the Gamer's Edge. Two free memory slots let you increase the total RDRAM to 2GB. There are also four free PCI slots (out of five), five free 3.5-inch drive bays (out of eight), and two free 5.25-inch drive bays (out of four).

Performance. I won't prattle on about audio/video performance because they were exactly what you'd expect from the system's top-notch audio/video components: "The Matrix" on DVD and Charles Mingus on CD played flawlessly.

The lab techs ran the usual slew of benchmarks, and the Gamer's Edge performed beautifully for all of them. SYSmark2002 scores included 209 in Office Productivity and 430 in Internet Content Creation for a total rating of 300. Faced with PCMark2002, the benchmark from Futuremark, the system earned a 7,577 CPU Score and a 7,838 Memory Score (2,000 is average for these scores) plus a 1,969 HDD Score (this score is scaled differently; 1,969 is quite high).

As for the score you've been waiting for, the 3DMark2001 score was a stupendous 15,887.

Final word. Keep in mind that the price tag is for the customized system I reviewed. The base price without monitor and extras is \$2,675. You get every penny's worth with the Gamer's Edge, including a three-year warranty on parts and a lifetime warranty on labor. ▲

by Cal Clinchard



Gamer's Edge

\$4,619

Velocity Micro

(800) 303-7866

(804) 897-6166

www.velocitymicro.com



Features

Processor:
P4 3.06GHz

RAM:
1GB

Hard Drive:
180GB RAID

Optical Drives:
48X/16X/48X
CD-RW; 16X
DVD-ROM

Connectivity:
Ethernet

Chassis Type: Midtower

System Use:
Entertainment

Final Word:
Expensive but awesome

iBUYPOWER Gamer 2003

iBUYPOWER is one among a handful of PC-makers on the scene today that offer top-notch gaming systems at a relatively low price. The Gamer 2003 is no exception. With its stylish design, performance that chewed up and spit out our standard benchmarks, and a price tag that's lower than much of the competition, it earned high marks in my eyes.

Specifications. The Gamer 2003 is built around an Intel D850EMV2 ATX motherboard and 850E chipset with Hyper-Threading, Rambus memory, and USB 2.0 support. Onboard there's a 3.06GHz Pentium 4 processor with a 533MHz bus, 512KB L2 cache, and

two 256MB RIMMs for 512MB total Rambus PC800 RDRAM.

The Western Digital Caviar hard drive has a 2MB buffer and 80GB capacity and spins at 7,200rpm. There's also an MSI 48X/12X/48X CD-RW drive, an Artec 16X DVD-ROM drive, and a Mitsumi 1.44MB floppy drive.

In the video department, there's an NVIDIA GeForce4 Ti 4600 4X AGP video card with 128MB of DDR RAM and ports for hybrid (VGA/DVI) output and TV input. A hefty ViewSonic E95 19-inch CRT monitor is included in the system price. The E95 has a low 0.22mm dot pitch and provides bright, clear imaging. A 5.1 Audigy sound card and Inspire 5.1 speaker set, both from Creative Labs, round out the Gamer 2003's multimedia capabilities with pure 5.1-channel Dolby Surround Sound.

The system has a two-port Ethernet card and an Intel 56Kbps modem, also on a PCI card, for connectivity. There's also an Microsoft PS/2 IntelliMouse, Microsoft Office Keyboard (the model with the carpal-tunnel-reducing onboard scroll wheel), and a 420-watt power supply. The software bundle includes WinXP Professional Edition, Norton AntiVirus 2002, Ahead Software's Nero Burning ROM, CyberLink's Power2DVD, and NVIDIA's nDVD.

Design. Remember the Visible Human, that 3D model with human organs visible through a clear plastic outer layer? Well, the Gamer 2003 could be called the Visible Gamer 2003, thanks

to its RaidMAX Clear Case. I liked the midtower case, which is made of clear Plexiglas and lit with blue neon to show off the internal components. The side panel comes off easily, but you'll need a screwdriver to add or remove drives or PCI cards.

There are five PCI slots on the motherboard (three available). The AGP slot, which the Ti 4600 occupies, handles only 4X AGP cards. On the back, there's one FireWire port and two USB 2.0 ports. You won't find additional USB ports hiding anywhere else, although the motherboard supports as many as seven USB 1.1 ports or five USB 2.0 ports. The preinstalled memory occupies two of the four RIMM sockets, and the motherboard supports as much as 2GB worth of PC800 RDRAM or 1.5GB worth of PC1066 RDRAM. In all, there are three 3.5-inch drive bays (one remains open) and four 5.25-inch bays (two remain open).

Performance. The Gamer 2003 flawlessly pumped out crisp DVD video and full-bodied CD audio—no surprise considering the Ti 4600 card and Creative audio gear. PCMark2002 scores were awesome overall, including a 7,482 CPU Score, a 6,256 Memory Score, and a 1,131 HDD Score. SYSmark2002 scores were also impressive, with a 207 in Office Productivity and a 411 in Internet Content Creation averaging out to a 292 Overall rating.

I was pleased to see a high 12,293 3DMark-2001 score, but with some current systems passing the 15,000 mark, the Gamer 2003's score didn't fly out of the ballpark. I also found it curious that the system didn't pull through with some higher frame rates when playing Quake III. At a 1,280 x 1,024 resolution, the video card cranked out frame rates of 72.8fps and 74.8fps for Demo 1 and Demo 2, respectively.

Final word. The Gamer 2003 may not have earned the best-possible 3D performance score, and it doesn't have an abundance of USB ports. But its stylish design and above-average overall performance makes it among the best gaming systems you can find for less than \$2,500. The system comes with iBUYPOWER's 30-day money-back guarantee (shipping and handling excluded) plus a limited warranty that covers three years for labor and one year for parts. ▲

by Cal Clinchard



Gamer 2003

\$2,447

iBUYPOWER

(888) 462-3899

(626) 281-8262

www.ibuypower.com



Features

Processor:
Pentium 4
3.06GHz

RAM:
512MB

Hard Drive:
80GB Western
Digital Caviar

Optical Drive:
48X/12X/48X
CD-RW; 16X
DVD-ROM

Connectivity:
Modem; Ethernet

Chassis Type: Midtower

System Use: Entertainment

Final Word: Decent 3D marks and affordable price make this a great overall gaming system.

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

ATI Introduces Radeon 9800



Anand Lal Shimpi has turned a fledgling personal page on GeoCities.com into one of the world's most visited and trusted PC hardware sites. Anand started his site in 1997 at just 14 years old and has since been featured in USA Today, CBS' 48 Hours and Fortune. His site—www.anandtech.com—receives more than 55 million page views and is read by more than 2 million readers per month.

ATI could get away with resting on the laurels of the Radeon 9700 Pro, as the 6-month-old card is still a better option than the GeForce FX. But with very short product cycles, ATI is doing their best to hold onto the performance lead they attained last year by refreshing their entire product line this spring.

At the high end, we have the replacement for the 9700, the 9800. When the 9700 Pro was released, I did some tests for AnandTech that revealed the 0.15-micron core was capable of hitting clock speeds as high as 400MHz without much effort. ATI knew of this and was planning all along to release a higher clocked version of the 9700 without any redesigns to the core itself. ATI waited until NVIDIA pulled the trigger with GeForce FX before bringing the 9800 to light, but truthfully they could have done it at any time.

The 9800 features the same architecture as the 9700, with a few minor changes. ATI has tweaked their HyperZ III technology a bit, but by far the biggest differences are in the increases in core and memory clocks. At the time of publication, ATI hadn't finalized clock speeds for the 9800, but you can expect an increase in the 15% to 25% range. Memory clocks will remain about the same, with a small boost quite probable, but nothing significant. The reason is that today's games are not memory-bandwidth-limited at all and won't be until we see some of the truly next-generation titles such as Doom 3. After all, by then the replacement to the 9800 will be ready, with a more significant boost in memory bandwidth. ATI also migrated to DDR2 memory technology with the 9800, not to increase clock speeds, but to reduce power consumption of the board. The 9800 will still require you to plug in a power source to the board, but ATI followed NVIDIA's lead and introduced a standard 4-pin HDD power connector instead of the floppy power connector that was on the 9700.

Quite possibly the most interesting part of ATI's spring lineup is their 9600, ATI's first 0.13-micron part. ATI's 0.13-micron transition strategy is

significantly different from NVIDIA's, as they will keep their highest-performing parts on 0.15-micron for another six months before migrating to 0.13-micron. The reasoning behind this was to crank out the 9800 as quickly and easily as possible. A die-shrink requires a nontrivial amount of engineering effort that isn't necessary at this point; the GeForce FX simply isn't competitive enough to warrant it.

The Radeon 9600, as you can guess, is a follow-up to the 9500 but with some fairly significant changes. When you perform a die-shrink like ATI did when transitioning from the 9500 to the 9600, the underlying architecture of the GPU remains the same, but the layout of the chip, among other things, has to be redone.

ATI took this opportunity to tweak some of the aspects of the original 9500, such as the memory controller, for optimum performance. Remember that the 9500 was nothing more than a 9700 with half of the mem-

ory controllers disabled (2 x 64-bit memory controllers instead of 4 x 64-bit); the problem with this approach was that all of the buffers and paths within the chip itself were optimized for a 4 x 64-bit memory interface. With the 9600, ATI took the opportunity to correct these issues, thus improving memory controller efficiency by a small amount.

The beauty of the 0.13-micron process is that ATI is able to crank clock speeds up significantly; once again, at press time, I didn't have final clock speed data, but it is feasible to have a higher core clock on the Radeon 9600 than the 9700 Pro. Memory speeds will remain as conservative as possible in order to keep costs down, but overall performance will be higher than the 9500 it is replacing.

With the Radeon 9700, ATI gained much-needed respect in the graphics industry; if they're able to bring the 9800 and 9600 to market with the same level of execution we saw before, then the snowy leadership mountain NVIDIA must climb will only become that much more treacherous. ■

ATI's 0.13-micron transition strategy is significantly different from NVIDIA's . . .

Radeon your thoughts to Anand@cpumag.com.

Wild On! IDF

I took myself, some clothes, a laptop, and a digital camera past the rather tight security (thanks to the orange) over to the Spring Intel Developer Forum. It's no bother and only just down the road from me in downtown San Jose. And what did I see? Journos from all over the world clambering around excitedly. Not in the same fashion as the Vegas porn-trade show, but definitely ahead of the Independent Funeral Homes convention. Pat Gelsinger, CTO, and Craig Barrett, CEO, kicked things off with a positive keynote speech, emphasizing the three Cs: computing, communication, and convergence. The first-ever public Photonics demo, or rather optical transmission of data (a digital image of Gelsinger) to a silicon modulator, was greeted with an uncomfortable silence. Maybe it was too early on in the day, or maybe nobody really understood what just took place. Either way, it was impressive, and I was there. Sarcasm aside, using light to send information around a chip as opposed to copper wires and electrons is no mean feat.

To keep us press folks and analysts happy, Barrett assured us that Moore's law is still applicable for the foreseeable future (another 10 years at least). 0.13-micron technology is in volume today with the Pentium 4, but he forecasted production for the 90nm process is still on target for later this year with Prescott and Dothan processors. This will be followed by 65nm in 2005, 45nm in 2007, and 37nm in 2009, which incidentally are all already in development today and not just plots on a road map. It's going to be a challenge going forward to actually be able to see these transistors, which are getting smaller and smaller. This is way beyond past optical microscopic techniques used in the past. So your CPUs will be getting smaller and smaller, and you'll need DKNY spectacles for your 2009 CPU upgrade.

Get ready to scribble down those code names, as Newport was shown off for the first time in mobile form running a next-gen 3D UI. The platform uses Centrino technology and will allow for even more usage via "closed lid" computing. That's when you close the lid on your notebook and can still work via a small LCD screen with function buttons for emailing, etc. The keyboard is detachable, too, so you can pose artistically while working. Intel is partnering with Lincoln; expect 2004 LS and

Aviator vehicles to sport units. Great-looking technology but vanilla partners in Lincoln. . . .

Next up was a demonstration of a desktop Marble Falls platform (also for 2004), which will sport integrated Nu Card technology, a dual-head-capable graphics chip, and even a camera. Using an ultra-small form factor design, integration will have other bells and whistles like PCI-X and dual Audio/Video capabilities. A Manitoba processor PX800f with (those three Cs) convergence, computing power, and communications combined on one chip, was on show. A nifty 312MHz CPU, GSM/GPRS, and 4MB of internal flash all on a single chip ran a racing game. This DSP technology is coming to a cell phone near you.

The third iteration of Itanium, code-named Madison, is already functional and due out later this year. With that in mind, a four-way Itanium 2 server featuring Madison was shown running some

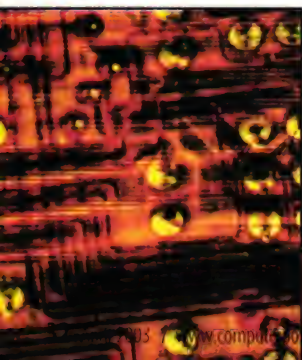
complex real-time 4D financial modeling analysis. This was probably the Doom 3 equivalent of a CPU hog in the financial world. Maybe with this kind of computing power, speculators will a) go to counseling for bipolar disorder and, b) stop flip-flopping around so much thanks to Madison. Maybe.

IDF yet again provided a great insight/crystal ball into the near/distant future of this industry, all according to Intel. But IDF-week isn't all about Intel. AMD and NVIDIA both set up discrete locations across the road in hotel suites to show off some really <expletive deleted> nifty non-disclosure agreement <expletive deleted> material. An Athlon 64 3000+ was shown running with an nForce 2 side by side with a P4 3.06. The two systems were almost neck and neck in the Hyper-Threading-enabled Photoshop test. (Athlon 64 was slightly quicker.) A mobile Athlon 64 reference design notebook was shown using the K8T400 chipset, as was an ATI M9 graphics chip, which should see the light of day around September. A groovy four-way Opteron system running SuSE Linux was up and running with the 8131 chipset, as well. After a slow start, the year can only get more active, it seems. ■

Send your "Wild On!" stories to
sharky@cpumag.com



Disrupting Reuters' newswire with a cheery Christmas greeting at age six, Alex "Sharky" Ross became an avid computer user/labuser, eventually founding popular hardware testing/review Web site SharkyExtreme.com. Exposing shoddy manufacturing practices and rubbish-spouting marketing weasels while championing innovative products, illuminating new technology, and pioneering real-world testing methods was just a front for playing with the best toys. The site acquired, he left in 2001. A London native and London School of Economics graduate, Alex currently swims in Silicon Valley.



Mine Is Bigger Than Yours



Kyle Bennett is editor-in-chief of HardOCP.com, one of the largest and most outspoken PC-enthusiast sites on the Web. HardOCP.com is geared toward users with a passion for PCs and those who want to get cutting-edge performance from their systems. Beware, though, Kyle is known for his strong opinions and stating them in a no-nonsense manner while delivering some of the most in-depth reviews and PC hardware news on the 'Net.

So you only got a 15,489 score? I got 15,501, so your box is obviously inferior to mine. At least that's what some folks would have you think. Such is the world of the virtual race-track, better known as the benchmark. Benchmarks cover a wide range of applications, but my comments here are focused on the 3D market. To be even more focused, when you look at benchmarking in the world of 3D gaming, all of a sudden we see that the landscape is barren, at best. There seems to be no lack of 3D games out there, and any trip to Best Buy will prove that to anyone. But try to put a tool set together so you can be better informed and the job gets really difficult.

This isn't a "woe is me" cry from a weenie editor; this is a look at the end of an industry that needs some changes made in it. There are factors at work here that are making gaming for you a lesser experience than it could be. Don't you expect the absolute best performance from your hundreds or even thousands of dollars' worth of games and hardware? Of course you do. Is that what you're getting? I would have to argue that you aren't, and there seem to be some heavy hitters in the industry who agree with me.

Benchmarking PCs has gotten to be big business in more than just a few ways. Entire magazines are sold with benchmarking as the backbone of making suggestions. Web sites cover this stuff like the world is hinged on it. (I know that for sure, as I run one.) Huge PC builders use benchmarks as a tool to gauge the worthiness of the competition. So how does this affect you?

As mentioned above, the tool set to test 3D gaming performance is very limited in both OpenGL and DirectX applications. You probably still see Quake3 used as a benchmark, although its value as a game can currently be debated. I still will play a few games of Excessive Deathmatch at a LAN, but really, that's about it. 3DMark2001 was still probably the most relied-on benchmark for DirectX, and it's not even a game but rather a synthetic benchmark. Even

today, although it's currently a little better than it used to be, the 3D benchmarks to pick from are few and far between, and this is harmful to the gaming industry as a whole.

This is where your pocketbooks come into the entire argument. With so many folks looking to such a lacking tool set for guidance, a lot of attention gets thrust upon the few tools that are there. My concern here lies primarily with the effect that synthetic benchmarks have on the marketplace. We've had discussions with large companies that build 3D PC hardware, and they will tell you that they spend huge resources optimizing for particu-

lar benchmarks. Now, in this, I don't mean they cheat. They look for what technology is being used inside the benchmark and optimize for that feature set. In Quake3, this most likely had huge benefits to the gaming community

overall, as there were many games based on that engine. On the synthetic benchmark side of things, it might be very different. There you have huge resources being poured into winning benchmarks, and those optimizations might never once benefit a gamer playing an actual game on his PC.

Do you see the money flying out the window now? If you have hundreds of software engineers working on optimizing for techniques that are never used in a game, this benefits no one except the company doing it. Rest assured, the guys that buy video cards pay for all this work.

Conversely, if we had better benchmarking tools and gave less value to synthetic benchmarks, wouldn't those same engineers be working on making actual games work better? Wouldn't that give you better frame rates and more stable games? My suggestion is that's what would exactly happen.

There is, of course, more to this argument than I have room to cover here, and be assured that it's being discussed online and at our Web site—which thinks the world is hinged on benchmarks. ■

There are factors . . . making gaming for you a lesser experience than it could be.

Talk with Kyle at kyle@cpumag.com.

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Each month we ask a staff writer to take on our publication editor in a challenge to build the best PC for a certain price. Because our writers don't want to lose their jobs, they always accept this challenge willingly. Tempers will flare. Tools will fly. But only one will prevail.

This month the challenge is to build the **Best Modded PC For Less Than \$1,500**

Samit

I tossed a lot of thoughts around as I set about to build the best modded PC for less than \$1,500, not the least of which was how much I wanted some sushi. Lincoln, Neb., is not exactly the place for sushi. So what's a man to do when he can't get fresh sushi and the doctor has temporarily ordered him away from those tasty 51-ounce T-bones? I could mull over insidious plots to build an apartment abattoir (no offense to our vegan friends out there) or start a "fresh" fish business, but I don't think I could handle the stench. Suddenly, getting

actually live together) by purchasing all my parts from reliable vendors, such as Directron, NewEgg, CompUSA, and OfficeMax. Sure, it still took me awhile to put the system together, but wasn't too bad (my first watercooled system, actually). OK, there was one minor task that required a tool: mounting a light switch into a 3.5-inch panel for the black light. Speaking of black lights, stay away from the StreetGlow black neons. Both of mine arrived DOA, so I had to run out to CompUSA on a UV light errand. Unfortunately, I lost \$49 on my StreetGlow, which is why I'm over budget.

Beautifying the case was a minor goal; I was focused primarily on coaxing out as much performance as I could. With the default software benchmark settings, I cranked out solid numbers in 3DMark 2001 SE. My highest 3DMark03 score was 4828. I used a shareware version of Powerstrip 3.30 to set the Engine Clock parameter to 376 and memory clock to 330. My CPU External Frequency setting in the BIOS went up to 185. I was able to run 3DMark all the way through but did encounter stability issues when I went higher. Of course, I had to kick up the core voltage to 1.850.

I was quite pleased with the stability of the NFORCE2-based ASUS A7N8X mobo using the Koolance watercooling system. (I purchased cooling blocks for the CPU, GPU, and mobo chipsets.) Overclocking was a cinch, and I eked out 2313MHz from my CPU without much trouble (yet). I mounted thermometers to help gauge the heat of the CPU, GPU, mobo chipset, hard drive, and RAM as I ran benchmarks and pushed the system to its limits. It's been entertaining. So much so that I'm considering a watercooled system at home. Heck, one more PC at home couldn't hurt, now could it?



back to the task at hand seems like a much better plan. It's time to reapply my insidious streak to something inorganic.

As you may be able to tell from the photos, there are few FWMs (fair weather mods). There's that nice big side panel, a UV light, UV-friendly cables/tape, and lots of pretty colours (courtesy of a bottle of UV water dye). I considered doing things such as cutting and repainting the case, but to be completely honest, FWM is just not my bag (that's not to say I don't enjoy checking out quality modded systems from time to time). I figured I would save myself the cost of tools (my wife has different priorities, and I want a few more home electronics before we

THE PC CHA



Samit Choudhuri
Publication Editor
Computer Power User

Component	Model	Price
Case	Black Directron PC2-601-WB w/side window	\$269
Motherboard	ASUS A7N8X (nForce2) ¹	\$119.99
Processor	AMD Athlon XP 2600+ (333)	\$260
Memory	Geil PC3200 (DDR400) 256MB ²	\$76
Hard Drive	Western Digital 40GB 7200RPM ¹	89.99*
Video Card	PowerColor Evil Commando 2 Radeon Pro 9700 (128MB) ¹	\$291
Sound Card	Built-In courtesy of NFORCE2	N/A
Network Card	Built-In courtesy of NFORCE2	N/A
CD-RW Drive	I/O Magic 48X16X48X ¹	\$39.99*
Diskette	N/A	N/A
Monitor	N/A	N/A
Speakers	N/A	N/A
Mouse	Microsoft Optical Blue Mouse ¹	\$25.19*
Keyboard	Microsoft Natural Keyboard Elite ¹	\$29.99*
OS	Mandrake 9.1 beta ⁴	\$0.00
Software	PowerStrip 3.30 shareware for WinXP testing, Nero, Asus Probe, BigInfo, Radeon 9700 Game Bundle	N/A
Miscellaneous	HyVee Natural Spring Water (16.9oz) ¹	\$0.50
	Antec Hard Drive Cooling System ¹	\$29.99
	CompUSA Aluminum Black Temperature Monitor (dual LCD) ¹	\$19.90
	PCToys Light MAXX Cold Cathode UV Kit ¹	\$19.99
	Vantec UV Sensitive Rounded FD cable (shielded 18-inch)	\$7.99
	Vantec Rounded IDE cable (shielded 24-inch) with two connectors	\$9.98
	Blue UV Water Dye ¹	\$9.98
	Power Cord ¹	\$1
	Arctic Silver II Thermal Compound ¹	\$7.99
	Enermax EC365P-VE(FC) Whisper 350W ¹	\$45.99
	Two CoolerMaster TLF-R82 Blue Neon LED Fans	\$39.96
	Koolance CPU Water Block CPU-100 ¹	\$34
	Koolance Video Cooler Water Block ¹	\$23
	Koolance Mobo Chipset Water Block ¹	\$23
Subtotal		\$1,555.35
Shipping		\$37.19
Tax		\$17.90
Rebates		\$70
Total		\$1,540.44

Purchased From:

- 1 Directron.com
- 2 NewEgg.com
- 3 Office Max
- 4 Best Buy

5 CompUSA

- 6 MandrakeLinux.com
- 7 Hy-Vee

*Items with a rebate

CHALLENGE



6.

Michael Sweet

Staff Writer
Computer Power User



Michael

Samit is the most tool-challenged guy I know, which is going to put the Insidious Klutz at a disadvantage. Samit's "mods" are more along the lines of "Some Assembly Required" rather than looking your beloved PC in the face and then cutting it up. That's modding—customizing existing parts to create a unique PC. Buying pre-made stuff "off the rack" doesn't count. There's building a PC, and there's *building* a PC.

I bought some nice components for my PC, but I wanted it to look cool, too. I started by cutting a window for my case. Blue is my favorite color, so I bought a few cans of Cobalt Blue Metallic Rustoleum paint and gave my case a makeover.

I decided to make my own rounded cables rather than buy them, which was easy enough. I just cut slits through a standard ribbon cable and wrapped them up with neon green plastic wire wrap that I found at a local hardware store. I bought a ThermalTake passive memory cooling kit to keep my RAM nice and cool, and it only took a few seconds to install. My system has four fans, so I picked up a Nexus NXP-201 fan controller to keep the noise down. I didn't want the ugly DVD-ROM drive bezel to spoil the look of my PC, so I took off the DVD-ROM drive's front bezel, altered one of the drive bay covers, and pasted it to the front of the drive.

No modified PC is complete without some cold cathode lights. I bought two:

one blue and one UV (both sound-sensitive). I also decided to change the light in my mouse. Red LEDs are so boring, so I replaced the red LED in my Logitech mouse with a blue one. Three mice died during this experiment, but I finally got it right on attempt number four.

The crown jewel of my modified PC is the water-cooling setup. I bought the tubing and clamps from a local hardware store and picked up a couple of Swiftech water blocks



for the CPU and video card. I found a sweet radiator and reservoir online, as well as a decent aquarium pump. I also added some water dye that glows neon green in UV light like toxic blood flowing through the veins of my system. The water cooler was tricky to set up, but once it was in place, I knew I could overclock my PC to dangerous levels.

Good looks, power, practicality, and the personal touch. I modded my system the old-school way, with blood, sweat, and tools. Samit went the pretender route, buying pre-fabbed parts that look cool but have no soul. We know who the real modder is.

Component	Model	Price
Case	Lian Li PC60 ¹	\$130
Power Supply	Enermax 465P-VE ¹	\$91
Motherboard	Gigabyte GA8PE667 Ultra motherboard ¹	\$134
Processor	Intel 2.4GHz	\$187
Memory	Crucial 512MB PC2700 ¹	\$116
Hard Drive	Western Digital SE 80GB ¹	\$107
Video Card	Leadtek A280	\$155
Sound Card	Integrated	N/A
Network Card	Integrated	N/A
DVD-ROM Drive	Toshiba 16X	\$40
Diskette	N/A	N/A
Monitor	N/A	N/A
Speakers	N/A	N/A
Mouse	Logitech optical mouse (plus three broken Logitech mice) ^{1, 2, 3, 4}	\$98.97
Keyboard	House brand ⁵	\$9.95
OS	WinXP Home ¹	\$93
Miscellaneous	ThermalTake memory heatsink kit ¹	\$7.99
	Blue Cold Cathode ⁶	\$18.99
	UV Cold Cathode ⁶	\$7.99
	CRE Air 120mm lighted fan ²	\$13.99
	Zip ties	\$1
	Blue LED	\$2
	Water reservoir ⁷	\$25
	Green water dye ⁷	\$10
	Nexus NXP-201 Rheobus fan controller ¹	\$26.95
	Swiftech CPU water block ¹	\$51.95
	Swiftech video card water block ¹	\$39.95
	Hose clamps ¹	\$5
	Hydor L20 water pump ¹	\$35
	Black Ice Pro Evo radiator ¹	\$52
	Rustoleum (four cans) ⁸	\$12.40
	Vinyl Tubing	\$1.69
	Wire wrap	\$2.99
	Acrylic panel ¹	\$8.49
Subtotal		\$1,485.30
Shipping		\$82.65
Tax		\$2.49
TOTAL		\$1,570.44

Purchased From: 4 CrazyPC 8 DIT
1 NewEgg.com 5 CoolTechnica 9 Best Buy
2 Xoxide .com 10 Circuit City
3 Cutting Edge 6 Wal-Mart
Case Mods 7 Menards

And The Winner Is...

There are two types of people in this world: Do-it-yourselfers and Off-the-shelfers. The Do-it-yourselfers are the people who invite you over for a meal and actually cook it themselves. The Off-the-shelfers strategically place the prepackaged food on the serving plates just before you arrive, being careful to hide the to-go bag. Or better yet, they just offer to pay for your meal at your favorite restaurant. There's nothing wrong with either type of person, even though we may tease people who couldn't boil their own spaghetti, or in this instance, cut a window in a case, to save their life. You have to admire a person for knowing his limitations and working around them. Personally, I'm glad Samit opted not to do his own cutting. I think we can all agree that would have ended badly. After tricking out the case with some neon lights and water dye, he focused his attention on overclocking and came up with some pretty impressive numbers. Michael went the DIY route and, I must say, I'm impressed with the outcome. His watercooled machine leaked a bit at first, but after some tweaking, he ended up with a perfectly viable PC that's a mod in the truest sense. Michael is over budget, but so is Samit, both of them having broken a few components along the way. Samit's overclocked rig is definitely sweet, but I'll give Michael the win for his hands-on handiwork.



DE-TERMINATOR

Jennie "DIY" Schlueter

Swappin' Parts

CINDI, What Drives You?

Each month in "Swappin' Parts," a Computer Power User writer upgrades one out-of-date component in our test machine, CINDI, a former eMachines eTower 600is. In the last two months, we've upgraded the machine's case, power supply, and sound card, and we've added a set of 5.1 speakers and some RAM. This month, we upgrade CINDI with new optical drives.

First, let me say I'm thankful that Michael "Overtorqued" Sweet already has given CINDI (Computer In Need of Drastic Improvement) a new look with a Cooler Master 201b case. Good thing, too. She was a super mega-ugly in her old case. Even worse, she was festooned with more stickers than a record store clerk's car.

Although MERLE's name grew to fit the masculine entity he became, CINDI's new name has emerged along with her recently discovered gender (which Michael checked). She's now a sleek, brown, aluminum vixen on the outside. But inside, well, CINDI still has issues. She's clinging to the past with obsolete hardware. She occasionally breaks down. And sometimes, she's just plain dysfunctional.

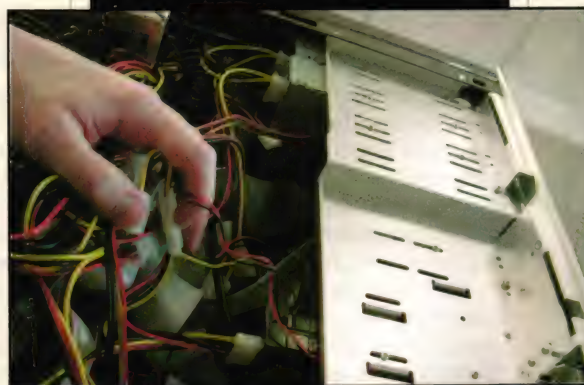
It's my turn to help CINDI shed some baggage, so to speak, and get a new perspective with a pair of optical drives. Why, you may ask, are we still letting CINDI trudge along with her chintzy old motherboard? Heck, I asked Pub Editor Samit the same question. In short, Intel's Springdale chipset is still on the way at this writing. So are more choices in mainboards with integrated Serial ATA. We'll leave CINDI in Celeronville another month or two so



Isn't she lovely? CINDI has become quite the looker, if you ignore that bezelless floppy drive.



The two new hunks in CINDI's world hail from Pioneer and Plextor.



Once you dig through all her cables, it is apparent CINDI has lots of room to grow. Bring on the chocolate.

we can give her a mobo we won't regret later.

Optical Elucidations

Our CINDI started out as an eMachines eTower 600is, poor soul. One of her few charms was a 40X Samsung SC-140 CD-ROM drive, which actually looked pretty good compared to the rest of her stale hardware. Be that as it may, it was time for our fair CINDI to take another step down "Pygmalion" way (or "She's All That" for you younger readers).

Despite the arrival of dual RW drives, including non-Sony ones, such as TDK's Indi DVD Multi-Format 440, we decided to retrofit CINDI with the legendary Pioneer DVR-A05U. This 4X/2X/12X DVD-RW is the connoisseur's choice for top-notch DVD-R compatibility with most players, not to mention 17MBps and higher max read speeds.

The Pioneer drive doubles as a 16X/8X/32X CD-RW, but that just wasn't good enough for our little CINDI Lou. We gave her the fastest Plextor CD-RW available at this writing, which is the PlexWriter 48/24/48A (PX-W4824TA). Mt. Rainier format support and unlimited toll-free tech support precede a long list of technical innovations, making this Plextor one for your short list.

This Won't Hurt A Bit

Before I started my clumsy meddling, I fired CINDI up to make sure she worked. She spun up with a curious "tick, tick, ticking" noise that hopefully didn't come from her Trigem rebranded hard drive. After the sound went away, CINDI virtually punched me in the eye with a

one-two combination no power user ever wants to see: a lengthy eMachines' splash screen followed by the Windows Me logo. Despite her new appearance, CINDI had just reminded me that she came from the seedy part of town.

It got worse. CINDI's tropical island desktop wallpaper warmed my winter bones, but the 30 or so AOL and CompuServe icons plastered all over it ruined the effect. Gritting my teeth, I ignored all these affronts and humanely shut CINDI off again.

I removed both side panels of the Cooler Master case and took a look around. As long as I didn't look too closely at CINDI's dinky motherboard, I could almost imagine her as the digital diva she will one day become.

I disconnected her old CD-ROM's data, power, and digital and analog audio cables. Next, I unscrewed the drive from its bay. The Cooler Master 201b doesn't have a removable drive cage, but I have to admire the way its thick-gauge drive bay walls stiffen the case. I pulled the CD-ROM out of CINDI's front panel and set it aside.

CINDI Learns To Burn

I counted four 5.25-inch drive bays in CINDI's case, two of which were still covered with blank plates. I removed the two screws holding in one fascia plate. I thought about keeping CINDI pretty by moving the Creative Audigy 2 breakout box down to the third drive bay and grouping the two new optical drives together. I decided against it, though, at least initially. My intention was to leave the Audigy in between the DVD-RW and CD-RW so that the Pioneer would have room for air to flow above and below it.

I planned to let the DVD-RW and CD-RW share a cable on the secondary EIDE channel, so I set the Pioneer as the master device through its jumper settings and the Plextor as a slave. I then noticed that the Pioneer had come without a data cable or mounting screws for some reason. I raided the hardware labs for some screws (what's that sudden clanking noise back there? Oh, well), then slid both drives into their bays and bolted them snugly in place.

Next, I removed the old CD-ROM's crusty data cable from CINDI's secondary IDE header and tried to install the new ATA/33 data cable that came with the Plextor. I say I tried because with the new optical drives mounted above and below the Audigy breakout box, the connectors on the data cable couldn't reach both. I also would have had to leave a nasty twist in the cable to mount the Pioneer above the Plextor, as the master device needs the end connector, not the middle one. I finally settled on mounting the Plextor in the top bay, the Pioneer below it, and the Audigy below the Pioneer. The data cable fit this arrangement perfectly.

CINDI's off-brand hard drive still had the primary EIDE cable all to itself,

**Despite her
new appearance,
CINDI
had just
reminded me
that she
came from the
seedy part of town.**

which is the way I like it. Not that I think that the drive is fast enough to really suffer if it shared its channel with another bandwidth-hungry device or anything. Hopefully there will be a Serial ATA savior coming along in a few months to smite this lowly 10GB pretender.

Although the Pioneer came with an analog audio cable, the Plextor came without any. Sigh. Fortunately, CINDI already had some new cables from the Audigy 2 episode last month. I connected the CD-RW's digital and analog output to the Audigy sound card's CD IN and CD SPDIF jacks, then the DVD-RW's analog audio output to the Audigy's AUX IN. No, the Pioneer doesn't have an SPDIF output. Take this up with Hollywood if it incenses you. Finally, I plugged power cables into both drives.

I booted up WinMe, not without wincing, and made sure both drives appeared in the Device Manager. A quick look at their properties affirmed that WinMe thought both drives were working fine.

I installed some of the software included with the drives, such as Sonic MyDVD 4.0 and CinePlayer 1.5, Roxio Easy CD Creator 5.3, and ArcSoft ShowBiz 1.2. This was foolish optimism on my part. Really, who wants to try and author DVDs with a 600MHz Celeron? OK, maybe somebody, but not me.

The Drive Home

Although two optical drives should be enough for any PC, I still felt funny about leaving out the perfectly functional 40X Samsung CD-ROM. If nothing else, CINDI could use it to keep the wear and tear off her better drives by playing audio CDs, game discs, and the like.

The main reason I tossed the Samsung in the closet was because I would have had to connect one of the optical drives to the hard drive's EIDE cable, which I hate to do, or add extra EIDE ports by way of an adapter card. Or perhaps a Silicon Image SC-SAT212 Serial ATA card, leaving the EIDE channels for the optical drives to squabble over. SATA would have tempted me to install a Serial ATA Deskstar 180GXP from IBM, er, Hitachi Global Storage Technologies. And that vast new screamer would have cried out for WinXP Pro, SuSE Linux, even DOS—anything but WinMe.

It was all too much temptation for one month. The fell gods of finance passed a shadow over the sun and growled, "Don't even think about it."

In any case, CINDI is pretty much set for CD and DVD burning. She also ended up looking a little more attractive after her Pioneer-Plextor makeover, although that nasty floppy drive still betrays her past life on the wrong side of the tracks. D'oh.

Fear not. There's a bit of plastic surgery ahead for our still-not-quite-a lady. Tune in next month as we give CINDI a new display and all manner of outward charms. **CPU**

by Marty Sems

X-ray Vision:

Mt. Rainier Drives CD-RW Speed, Reliability

Keeping up with the latest list of technology breakthroughs and hardware specifications and learning to use them can make you feel as if you're at the foot of a huge mountain. Just as you begin to make some progress in scaling the mountain, some new technology knocks you back to the bottom.

For technology involving your CD-RW drive, though, the Mt. Rainier specification can make your journey far easier. Think of Mt. Rainier as your personal

Sherpa for climbing the mountain of CD-RW technology. (Warning: Obscure reference to "The Simpsons" ahead.) You won't even need a Powersauce bar to reach the summit of Mt. Rainier technology.

Base Camp

The Mt. Rainier Group, which Philips leads, developed the Mt. Rainier specification.

At the time of the Mt. Rainier Group's development, Philips, Sony,

Microsoft, and Compaq (now Hewlett-Packard) were its leaders. The Mt. Rainier Group lists dozens of other companies as contributors to Mt. Rainier support.

The goal of the Mt. Rainier group is to make using a CD-RW drive as intuitive as using a hard drive or floppy drive. (That's the ancient slot on the front of your PC that's probably slowly filling with dust.) Although floppy drives are slipping in popularity, the idea behind using them isn't: You can drag and drop files to and from a floppy drive because the OS controls the drive directly. Eventually, Mt. Rainier will bring such built-in drag-and-drop capabilities to your CD-RW drive.

Currently, you have to use third-party software to add and remove files from most CD-RWs. In some cases, using a packet writing application, you can drag and drop files directly to and from a CD-RW drive. However, Mt. Rainier would simplify this process further by integrating such support into the OS. Full integration for Mt. Rainier technology within the OS probably won't appear for a year or two until the next version of Windows appears. However, Mt. Rainier technology is already appearing in many CD-RW drives, giving users access to some of its benefits until full-fledged OS support arrives.

Mt. Rainier Technology

In addition to bringing basic drag-and-drop capabilities to CD-RW drives, Mt. Rainier offers a few other improvements that make the overall process of using CD-RWs easier, faster, and safer for end users. (Subscribers can view detailed graphics that illustrate these improvements at www.cpumag.com/cpuapr03/mtrainier.)

Managing defects. Through the Mt. Rainier specification, the task of

Drives With Mt. Rainier Support

Many new CD-RW drives are providing support for Mt. Rainier technology. As you look for Mt. Rainier CD-RW drives, you might see the EasyWrite logo, which signifies compatibility with the Mt. Rainier spec. Mt. Rainier support also sometimes appears as CD-MRW, short for CD-Mount Rainier, Read/Write. However, this reference mainly appears in Mt. Rainier Group literature and inside the tech industry; information generated for the public rarely uses the CD-MRW abbreviation. Many new CD-RW drives provide support for Mt. Rainier.

Here are five CD-RW drives you may want to consider if you're looking for Mt. Rainier capabilities.

CenDyne Lightning V ReWriter 52X/24X/52X

\$129
(714) 556-1020
www.cendyne.com
Internal drive
CD-R: 52X
CD-RW: 24X
CD-ROM: 52X
2MB buffer
95ms average access time

Lite-On LTR-52246S

\$79
(408) 935-5353
www.liteonit.com.tw/english/index-english.htm
Internal drive
CD-R: 52X
CD-RW: 24X

CD-ROM: 52X
2MB buffer
80ms average access time

Pacific Digital Mach52

\$80
(949) 252-1111
www.pacificdigital.com
Internal drive
CD-R: 52X
CD-RW: 24X
CD-ROM: 52X
2MB buffer
80ms average access time

Plextor PlexWriter 48/24/48U

\$209
(510) 440-2000
(800) 886-3935

www.plextor.com
External drive
CD-R: 48X
CD-RW: 24X
CD-ROM: 48X
4MB buffer
65ms average access time

TEAC CD-W552E

\$129
(323) 726-0303
www.teac.com
Internal drive
CD-R: 52X
CD-RW: 24X
CD-ROM: 52X
2MB buffer
100ms average access time

managing defects on a CD-RW moves from the packet-writing application to the CD-RW drive hardware. This process simplifies defect management; packet-writing applications must have information on all possible drive and media combinations to perform the same task adequately. Such complexity has sometimes led to irreparable optical disc errors and lost data.

2KB addressing. Mt. Rainier also introduces support for 2KB logical addressing, bringing CD-RW drives in line with the addressing capabilities of most file management systems. Without Mt. Rainier, most CD-RW drives use 64K logical addressing. Even with this change, Mt. Rainier maintains backward compatibility with current CD-RW drives by supporting UDF (Universal Disk Format), which is the system most CD-RW drives use.

Background formatting. The benefit end users will probably notice the most, though, is the background formatting. Without Mt. Rainier, you might wait 20 minutes or more for complete formatting before you can begin using the CD-RW. Mt. Rainier's background formatting gives you the ability to begin writing data to the disc within a few minutes of inserting it, even before the full

formatting process is complete. This feature alone greatly improves the usability of CD-RWs. (With full-fledged OS support in the future, the waiting time will drop to several seconds.)

Warning: Rock Slides Ahead

Although Mt. Rainier offers plenty of advantages, there are a few potential



The Pacific Digital Mach52 is one of several new CD-RW drives that supports the Mt. Rainier specification.

pitfalls that not even the best Sherpa can help you avoid.

Older drives. Older CD-RW drives will need a firmware upgrade to achieve Mt. Rainier support if individual manufacturers choose to make one available. Without

an upgrade, some older drives won't be able to read Mt. Rainier-formatted CD-RWs. (Mt. Rainier drives, however, should be able to read all other CD formats.)

Older OSes. Even after full-fledged support for Mt. Rainier appears in Windows (probably in the next Windows version, code-named Longhorn), older Windows versions will probably need bridge software to fully support Mt. Rainier. (See the "Integrating Mt. Rainier With Older OSes" graphic.) For Linux users, Mt. Rainier support initially appeared in the 2.4.19 kernel.

Older software. Most vendors of the third-party software that currently handles CD-RW drives are supporting Mt. Rainier; however, you'll probably need to download a patch if you're using an older version of the third-party software.

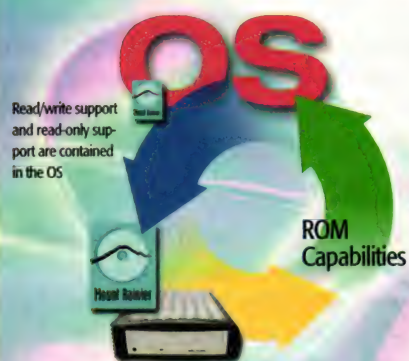
The Summit

Obviously, the key to Mt. Rainier's ultimate success will be native support through OSes. Although the Mt. Rainier spec has been available for nearly two years and the first Mt. Rainier-compatible drives were announced about one year ago, full-fledged support within the Windows operating system probably won't appear for one to two years, either through a new Windows version or through a major WinXP upgrade. Once that happens, users will be able to experience the full capabilities of Mt. Rainier. Until then, users will have to settle for the limited benefits a Mt. Rainier drive can provide for CD-RW users now . . . which isn't a bad consolation prize.

In the long run, Mt. Rainier technology might be pointing more toward rewritable DVDs than CD-RWs. Mt. Rainier's specs incorporate support for the DVD+RW format, which is competing with DVD-RW, among others, to become the standard format for rewritable DVDs. (Not surprisingly, Philips and Microsoft have announced support for DVD+RW over other formats.)

With Mt. Rainier technology behind it, DVD+RW just might have a head start in climbing the rewritable DVD mountain. **cpu**

Integrating Mt. Rainier With Older OSes



When an OS contains integrated support for Mt. Rainier, it would support both the writing and reading capabilities of the CD-RW drives, ensuring compatibility. Mt. Rainier would interact with the OS and control the ROM capabilities of the drive, allowing it to send data to the OS, as shown in this example.

Source: Mt. Rainier Group



When an older OS doesn't offer built-in support for Mt. Rainier, it would require a bridge application that would serve as the liaison between Mt. Rainier and the OS, as shown above. The bridge application contains a read/write driver for the Mt. Rainier CD-RW drive and a generic read driver for the drive's ROM capabilities, ensuring compatibility.

NVIDIA GeForce FX 5800

New Graphics Boards Have A Lot To Prove

When NVIDIA has something to say, most of the tech media begins taking notes. The Santa Clara, Calif., company has long been at or near the forefront in graphics technology. So, when NVIDIA asked, "Are you ready?" several months ago on a Web site designed to preview and promote its new GPU, code-named NV30, we took notice. The "Are you ready?" campaign generated plenty of buzz, especially because the release of the NV30 had been delayed a few months and gamers and graphics enthusiasts have been waiting anxiously for the new chips and boards.

NVIDIA's NV30 has evolved to become the GeForce FX GPU, and graphics boards featuring the new GPU should now be available on retail shelves. The GeForce FX 5800 and the GeForce FX 5800 Ultra from NVIDIA are two of the first graphics boards available featuring the new GPU. (The "5" in 5800 apparently

signifies that this is the fifth version of the GeForce GPU, even though NVIDIA is no longer numbering the chips sequentially when naming them.)

Battling Delays

Expectations originally had projected the NVIDIA GeForce FX 5800 graphics boards for an autumn 2002 release, a month or two after the scheduled release of the GeForce FX GPU in August 2002. But delays pushed back the release dates.

In attempting to produce a GPU that was about twice as fast as the early 2002 release of the GeForce4, NVIDIA decided to manufacture the GeForce FX chip with 0.13-micron fabrication. It was this manufacturing process that was reportedly the major glitch that delayed the launch of the GeForce FX. The GPU actually appeared at COMDEX in November 2002. The 5800 boards were scheduled to begin appearing in late February or early March.

Although a product delay of three or four months doesn't seem as though it should cause a major problem, in the fast-moving GPU industry, it can be very costly. First, the delay broke a cycle where NVIDIA had been releasing significantly faster GPUs every six to nine months, leading some analysts to question the company's direction. Second, NVIDIA's chief rival in GPU manufacturing, ATI, was able to release its next-gen chip, the Radeon 9700, in July 2002, leaving NVIDIA playing catch-up, a position with which it's not familiar. ATI was able to reach the market more quickly by using the more mature 0.15-micron manufacturing process, and its wager paid off when delays in the 0.13-micron process plagued NVIDIA.

As an additional potential headache for NVIDIA, ATI reportedly is finishing work on an upgrade to its Radeon 9700 graphics chip (code-named the R400) and may release it early in the second half of 2003. If it offers significant improvements in core clock speed and memory speed, NVIDIA could find itself on the defensive again. It's a role reversal from ATI's position when it released the Radeon 9700 (see the October 2002 issue of *CPU*, page 42), worrying that NVIDIA's upcoming NV30 chip would trump it within a few months.

The First Boards

The 5800 GeForce FX Ultra graphics board (with an expected retail price of \$399) will feature a 500MHz core clock and a 1GHz memory throughput clock speed for its DDR2 memory. The 5800 (with an expected retail price of \$299) will feature a 400MHz core clock and an 800MHz memory throughput clock speed. NVIDIA's partner companies will be releasing their own graphics boards featuring the GeForce FX GPU in the upcoming months. (NOTE: The specs and descriptions in this article are for preview editions of the

GeForce FX Games

Several new and upcoming games will be designed to take advantage of GeForce FX technologies, including:

Age of Mythology.

This war-simulation game from Ensemble Studios and Microsoft lets you take on the role of one of nine ancient civilizations.

Command & Conquer Generals. The 3D battle environments are impressive in this war-simulation game from Electronic Arts.

Delta Force: Black Hawk Down. Based on

real events in Somalia, the realistic settings and weaponry in this game from NovaLogic are impressive.

Doom III. This is the latest incarnation of the classic first-person shooter game from id Software and Activision, and it has never looked better.

RalliSport Challenge.

Try racing cars in a variety of great-looking environments in this game from Microsoft and Digital Illusions.

SeaDogs II. You can stick with the story line

or sail away on a unique adventure in this role-playing pirate game from Akella and Bethesda Software.

Splinter Cell. This role-playing action game from Ubi Soft features covert ops characters and a story Tom Clancy inspired.

Unreal II: The Awakening. Amazingly rendered alien worlds add to the impressive feel of this game from Legend Entertainment and Epic Games. ▲

5800 boards; NVIDIA hadn't officially announced the new graphics boards before this issue went to print.)

Keep it cool. Because of the 5800 Ultra's higher clock speeds, NVIDIA has engineered a complex cooling fan system, initially called FlowFX, to keep the board from overheating. The fan actually runs at higher speeds when the board is running at a higher clock speed, such as when the 3D graphics pipeline is in use. (The clock speeds listed above are the maximum speeds available in the 5800 Ultra and the 5800; the cards will automatically run at lower clock speeds when the graphics processing demands on the board are lower.) The cooling system causes the graphics card to weigh about 1.5 pounds.

The fan on the 5800 Ultra is large, and it requires an adjacent, open slot to

accommodate the thickness of the card with the fan attached. The fan pulls air from outside the computer case, runs the air over the board, and exhausts the air through the back of the computer case. The board's heatsink sits in the opening in the back of the computer case reserved for the adjacent slot that must remain open. (Essentially, the board occupies space equal to two slots, even though it only plugs into one AGP slot.) The fan for the cooling system only cools the GPU and the memory on the board; the heatsink on the rear of the board is passively cooled, meaning it can heat up quickly.

The higher clock speeds force the 5800 boards to use a power source in addition to what's available through the AGP bus, which is common with newer graphics boards. To achieve maximum speed with

the 5800 boards, you must connect them to the computer's power supply through a standard 4-pin hard drive power cable. If you don't connect the board with the power supply, the board will automatically run at a lower clock speed to prevent damage from overheating.

What's Inside

The GeForce FX GPU that powers the 5800 boards offers several new and improved features to create cinema-like effects on the PC.

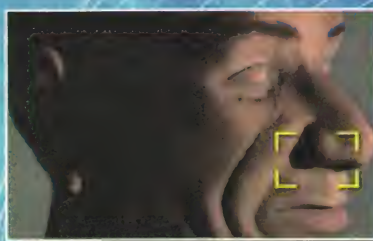
DDR2 memory. The GeForce FX uses DDR2 memory—the latest type of high-speed memory chips—to improve its overall performance, especially when rendering 3D images. DDR2 memory uses a 4-bit prefetch, effectively doubling the memory throughput over DDR (and quadrupling it

Color Me Realistically

NVIDIA has built the CineFX engine to include support for true 128-bit color (32-bit floating-point formats for red, green, blue, and alpha). NVIDIA decided to use 128-bit color as its standard to match the standard motion picture studios use when creating computer-generated scenes.

When running CineFX, developers can choose to use either 16- or 32-bit floating-point formats (16FP and 32FP), depending on the needs of their project. Using 32FP will provide top-quality color and image quality with some sacrifice in performance, while using 16FP will provide top-quality performance with some sacrifice in color effects.

Developers can even switch between the formats within one shader program, letting them choose improved speed or improved image quality as they need it.

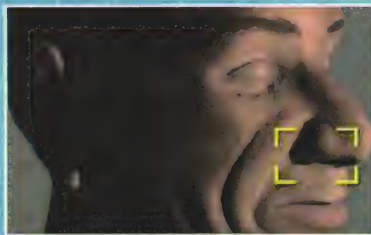


Low Precision

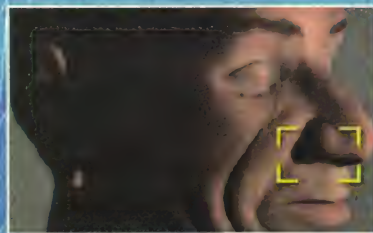


Early in the shader program, a developer might choose to run 16FP because rendering speed is more important than image quality.

When encountering a large texture later in the shader program, the developer could switch to 32FP to accommodate the texture's rendering requirements, while slightly sacrificing execution.



High Precision



Low Precision



Finally, the developer might choose to return to 16FP because rendering speed is once again the key element in the shader program.

SOURCE: NVIDIA

over standard memory) without actually increasing the clock speed. DDR2 memory chips running at a 1GHz memory throughput clock speed are actually running at a 250MHz clock speed.

DirectX 9.0. By building the GeForce FX GPU to take full advantage of DirectX 9.0 specifications, NVIDIA says boards based on the GeForce FX will give users and developers unprecedented image quality. The CineFX graphics engine helps the GeForce FX chip meet DX9 specs. (More on the CineFX engine later.) However, the GeForce FX isn't the first GPU to fully support DX9; ATI's Radeon 9700 owns that distinction.

High bandwidth. The ability of the GeForce FX GPU to create cinema-like effects is due in part to its high graphics bandwidth capabilities of eight pixels per clock cycle. The chip uses the AGP 8X graphics bus specification, which increases the bandwidth between the graphics board and the remainder of your computing system. AGP 8X allows for more efficient and faster use of the system's main memory area by the graphics board, which allows for improved overall graphics performance. Because developers, especially game developers, continually ask the graphics card to create images with more complex textures and lighting, the GPU needs to be able to move large amounts of data quickly. The GeForce FX's high bandwidth capabilities accomplish this goal.

Intellisample. Anti-aliasing has long been a problem in graphics rendering, although newer graphics chips have lessened the problem. The GeForce FX virtually eliminates problems with anti-aliasing through its Intellisample technology. Intellisample technology lets the GPU handle both Z compression and color compression, which creates smoother edges and more realistic colors in the final rendering with little or no loss of performance.

0.13-micron fabrication. The 0.13-micron manufacturing process NVIDIA chose for the GeForce FX GPU helps it to achieve a high clock rate, which leads to a higher frame rate. By using 0.13-micron fabrication, NVIDIA could shrink the size of each transistor on the chip and the chip itself.

Cg language. NVIDIA has included support for Cg, the company's high-level graphics programming language, in the GeForce FX GPU. Cg simplifies the programming process for creating shaders.

The CineFX Engine

Although the use of Cg has laid the groundwork for cinema-like effects in graphics processing, the GeForce FX's CineFX engine is providing the muscle. CineFX gives boards containing the GeForce FX GPU the ability to render such effects in real-time with minimal losses in quality or rendering speed.

increasing the number of instructions per vertex it can handle, the CineFX engine not only increases the number of computations that can occur on each vertex, but it also reduces the overall number of vertex shaders an application will require (with one longer shader instead of several smaller ones to achieve similar effects).

By increasing the number of vector constants the GPU has available from 96 to 256, the engine can handle more detailed aspects of the overall image, such as simultaneous light sources.

Finally, CineFX gives developers access to the flow control capabilities built into

Board Specs

Here are the projected specifications for NVIDIA's GeForce FX 5800 and 5800 Ultra graphics boards.

	5800	5800 Ultra
Chip technology	256-bit	256-bit
Transistors	125 million	125 million
Core clock speed	400MHz	500MHz
DDR2 memory throughput	800MHz	1GHz
Memory bus width	128-bit DDR2	128-bit DDR2
Memory bandwidth	12.8GBps	16GBps
Theoretical fill rate	3.2Gpixels/sec	4Gpixels/sec
Anti-aliased fill rate	13 billion/sec	16 billion/sec
Color bits per channel	10	10
Maximum displays	2	2
AGP 8X support	Yes	Yes
DX9 support	Yes	Yes

Source: NVIDIA, A1 Electronics

CineFX gives the GeForce FX full support for the DX 9 specification (as well as for the latest OpenGL specification). This means CineFX can help the GeForce FX take advantage of the additional programming power available in the latest versions of pixel shaders and vertex shaders found in DX9. It also can support true 128-bit color.

Vertex processing. By taking advantage of the latest DX9 specs for vertex processing, the CineFX engine provides additional power and sophistication for programmers when creating visual effects. For example, CineFX can support 65,536 instructions executed per vertex, using techniques such as data-dependent branching. (Previous processing engines could only support 128 instructions.) By

DX9. Flow control allows for use of dynamic loops, subroutines, and branches that can call for forward or backward changes in flow, which simplifies the overall programming process while making the final results of the programming more sophisticated. The flow control available in DX9 also gives the developer the opportunity to enact early termination of the vertex shader program, which speeds the overall processing. The developer tells the vertex shader program to branch to the end of the program and terminate itself if certain conditions are met. After terminating, the vertex shading engine can pass the results to the next step in the GPU pipeline and begin work on the next vertex, which speeds the overall process. Under DX8, early termination wasn't

Rumors Cloud Ultra's Future

Just as this issue was going to print, rumors began appearing on the Internet concerning the future of the GeForce FX 5800 Ultra board. The Inquirer (www.theinquirer.net) reported on rumors that NVIDIA was considering scrapping the higher-priced 5800 Ultra board before it hit retail markets, choosing instead to focus on its next incarnation of GeForce FX GPUs, code-named NV31, NV34, and NV35.

The company reportedly is considering a couple of other options, as well. First, only the 5800 board—with its lower price point—may end up appearing in the retail channels. The company then would scrap the 5800 Ultra and focus on developing a more efficient cooling system for future high-end GPUs in the GeForce FX family. This option could be a PR nightmare, especially because the company released several 5800 Ultra boards to media outlets in late January for reviews—many of which weren't overly flattering—and because many people have preordered the boards through retail outlets. (Want some more fodder for these rumors? The Best Buy Web site at one time was accepting preorders for the 5800 Ultra, but it was no longer taking orders as of mid-February.)

Another possibility is that NVIDIA may still choose to offer the 5800 Ultra to retail channels, just in a limited production, while also working on cooling systems for future high-end GPUs. This move would make some sense because the company would avoid many of the PR problems.

If the rumors are untrue, you should see plenty of 5800 Ultra and 5800 boards available for purchase by the time you read this. However, it's also possible that by the time you read this, NVIDIA will have gone in a different direction concerning its high-end graphics boards. ▲

allowed, meaning the vertex shading engine would have to calculate the entire program, even if the final few sets of calculations had no effect on the overall image quality.

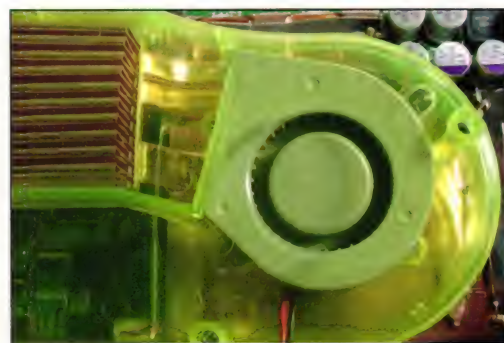
Pixel processing. Through the programming capabilities built into DX9, developers can control individual pixels and create amazingly realistic effects. NVIDIA says the incorporation of CineFX and the move from DX8 to DX9 has brought true programmability to GeForce FX boards. (DX9 incorporates the Pixel Shader 2.0 specification.)

Programmers can now incorporate up to 16 texture maps per pixel shader program, which provides unprecedented control and image quality. Four texture maps were allowed previously. The 16 texture maps can call a wide variety of surface properties, including bump, gloss, and shadow maps.

Developers using CineFX can now create programs containing as many as 1,024 texture instructions per pixel shader program instead of the four instructions available previously. When combined with the 16 texture maps available now, developers can create some amazing effects, such as soft shadows, improved blurring techniques, and nonphotorealistic effects.

CineFX also supports a maximum of 1,024 color instructions per pixel shader program. As developers incorporate more complex lighting effects or other special effects, such as fire and smoke, the number of color instructions required can reach into the hundreds. The increase in the number of color instructions available has greatly simplified this rendering process.

Developers can use the Pixel Shader 2.0 math instructions to solve arbitrary math algorithms, taking full advantage of the fast mathematical processing abilities of the CineFX engine to create more specialized, distinctive color effects. For example, the developer could create his own mathematical formula for a particular color and lighting effect that others can't duplicate without duplicating the mathematical formula. The CineFX engine can render the complex mathematical instructions quickly enough to avoid a loss in performance.



In this close-up of a preview board, the 5800 Ultra's cooling system protrudes from the board and exhausts air out the back of the PC.

Developers can make further use of the CineFX engine's fast mathematical processing abilities to solve some problems on the fly. For example, a developer could create some textures, such as a wood grain, by using mathematical formulas to calculate the pixel colors rather than applying a texture map to an object (called procedural shading). By using procedural shading, developers can avoid some tricky procedures, such as mapping a 2D image to a curved object. This capability gives developers the opportunity to choose the best technique, depending on the circumstances surrounding the problem.

Finally, when running CineFX, programmers now can create a single-pass pixel shader to apply several effects during one pass through the shader engine. This greatly speeds the execution of the programmer's instructions and improves the overall performance of the graphics card.

Intriguing Technologies

The GeForce FX GPU and the boards featuring the chip are bringing some interesting technologies to the forefront. Many high-end gaming and graphics enthusiasts are eagerly awaiting the chance to put some of those technologies to the test. Once you actually try the product, NVIDIA is hoping you're ready to be amazed. **CPU**

by Kyle Schurman

For more information, subscribers can go to www.cpumag.com/cpuapr03/gffx.

room to burn



VINYL



DIGITAL VIDEO



DATA BACKUP



ORIGINAL MUSIC



DIGITAL PHOTO



MP3





Get organized, and take your files with you wherever you go. Burn all your data, video, photography, MP3s, vinyl, cassettes and whatever else you've got to CD with Easy CD Creator® 5 Platinum, from Roxio. The best selling CD burning software in the world. You can even create your own personalized jewel cases for each disc. Hit roxio.com to find out how. Mac® users check out Roxio's Toast® 5.

Now Windows® XP compatible.



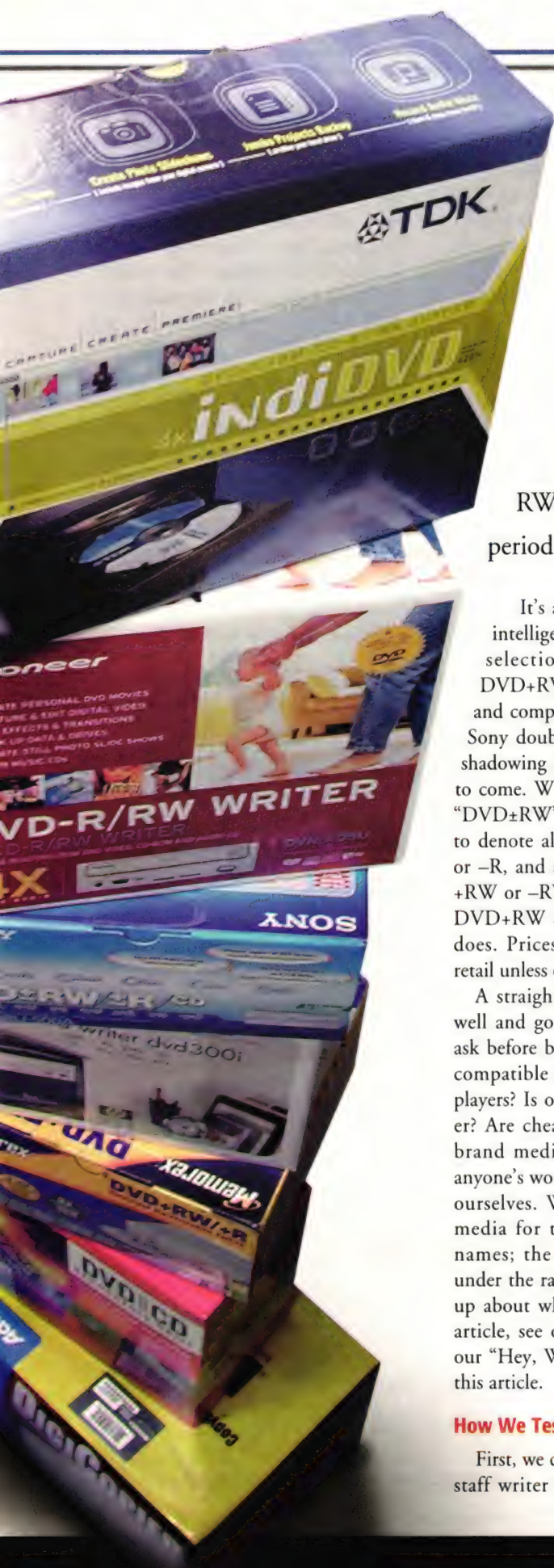
roxio

DVD Test Drive

We Take DVD Writers To Town

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It's about time. Rewriteable DVD time, that is. Mainstream users are getting the message that these 4.7GB discs aren't much different to use than CD-R/RWs, yet offer almost nine times the storage. Drive prices have fallen, and the DVD-RW/DVD+RW format combatants may even soon enter a period of coexistence.

It's also time for some battlefield intelligence. We lined up a raucous selection of nine DVD-RW and DVD+RW drives for reading, writing, and compatibility tests. We even had a Sony double agent in the bunch, foreshadowing the divided loyalties of drives to come. We'll use generic "DVD±R" or "DVD±RW" abbreviations in this article to denote all readable discs, whether +R or -R, and all rewriteable discs, whether +RW or -RW. We'll call the DVD-RW/DVD+RW Sony a "dual RW," as Sony does. Prices we've listed are suggested retail unless otherwise noted.

A straight-up benchmark brawl is all well and good, but the real question to ask before buying a DVD burner is how compatible will it be with home DVD players? Is one format better than another? Are cheaper discs as good as name-brand media? We didn't want to take anyone's word for it; we wanted to see for ourselves. We selected eight brands of media for testing. Five are household names; the other three are hot sellers under the radar. If you're already heating up about what we *didn't* include in this article, see our "Upcoming Drives" and our "Hey, What About . . .?" sidebars in this article.

How We Tested

First, we commandeered a test PC from staff writer Nathan Chandler equipped

with a 2.67GHz P4 with a 533MHz front side bus on an Intel D845GEBV2 motherboard, buttressed by 384MB of DDR SDRAM, a 20GB Quantum Ict20, and WinXP Pro SP1.

This colorful, new test PC inspired us to squeeze the irrigation bulb on our testing procedures, so to speak. We arrived at a list of tests that covered most of what we wanted to know in the short time we had to do them:

- **Write tests.** We timed transfers of a 4GB test folder of mixed file types using Nero 5.5.10.7. We used properly speed-rated media supplied by the drive's manufacturer when possible, as those brands generally work well with their assigned drive. Some drives revert to slower burning speeds with certain disc brands, so check with a drive's manufacturer for recommended media. We had to skip our usual CD-R or CD-RW transfer tests in the interest of time. However, one could argue that most power users prefer to spare their DVD±RW some mileage with a faster \$89 CD-RW anyway.
- **Benchmarks.** For our read-speed tests, we ran each drive through Nero DVD Speed 0.53B. We set DVD Speed's transfer-rate tests for maximum speed instead of for accuracy. DVD Speed required a full single-layer DVD-ROM for its read testing, so we finally found a real use for that shiny 4.32GB DVD

Tach disc we were about to play Tron with. We also set DVD Speed to gauge each drive's access time instead of its seek time. Seek time is the length of time in milliseconds it takes the drive to position its heads over the right ring of a disc's spiral track of data; access time adds the length of time for the disc to spin around to the piece of data the drive was looking for. It's easy to make a ballpark estimate of a hard drive's access time after you measure its seek time because hard drives generally spin at a constant rpm. However, optical drives, such as DVD±RWs, often spin at different speeds under different conditions, outlined more fully in our "CAVing Season" sidebar in this article. For this reason, access time becomes more important to measure in optical drives.

Format compatibility. Next, we consulted InfoTool 1.03 and CloneCD 4.2.0.2 on the formats that each drive's firmware claimed it could read and write. These included raw data modes, such as RAW-DAO (RAW-disc at once) and RAW-SAO (RAW-session at once), often used to make fair-use backups of protected-content discs.

DVD playback. Rants and raves about drive/media and media/consumer DVD player compatibility abound on online forums. We couldn't verify or disprove anyone's personal experiences, so we decided to do our own tests. We copied a DVD of noncopyrighted home video to our test PC's hard drive and then to six or seven brands of R and RW media with each drive. Our test DVD contained three video clips and a root menu, totaling 813MB of MPEG-2 data. Some

users have reported problems with various DVD media only in the last gigabyte or so of full discs, which these particular tests didn't address. These playback tests were for compatibility, not speed, so our purchasing agent bought media readily available on store shelves. This included 2X DVD-Rs (General, not Authoring), 2.4X DVD+Rs, 1X DVD-RWs, and 2.4X DVD+RWs.

We played each disc on five different home DVD players hailing from 1998 to 2002. Most people don't have the latest and greatest in their living rooms, so we didn't spare our contestants from harder-to-please older players. We also gave CPU ratings (1 to 5) based on our assessment of each drive's relative value in today's market. (Special thanks to Chad Dalton and Coby Boring in our CPU hardware labs for their efforts.)

W h a t ' s B u r n i n g ?

We burned copies of an 813MB DVD-Video with each drive using six or seven brands of media. Next, we tried to play each disc on five different home DVD players, which are generally harder to please than most DVD-ROM drives in PCs. We made sure we could navigate

the root menu of each disc and access all three of the disc's video clips before we gave it our stamp of approval. The numbers in the chart below indicate which players could recognize and play each disc; the letters mark any problems we had with a particular disc on that player.

DVD-RWs	FujiFilm DVD-R 2X 2.0	Maxell DVD-RW 1X 1.1	Memorex DVD-R 2X	Memorex DVD-RW 1X 1.1	TDK DVD-R 2X 2.0	TDK DVD-RW 1X 1.1	Ritek DVD-R 2X	Ritek DVD-RW 1X	Optodisc DVD-R 2X	Optodisc DVD-RW 1X	Princo DVD-R 2X	Princo DVD-RW 1X 1.1
Addonics AEDVD-COP4UM 4X	1,2,3,4,5	1,2	1,2,3,4,5	1	1,2,3,4,5	1	1,2,3,4,5	1	1,2,3,4,5	1,2,3	Failed to burn	1
CenDyne DVR-105 4X	1,2,3,4,5	1,2	1,2,3,4,5	1	1,2,3,4,5	1	1,2,3,4,5	1,2(b)	1,2,3,4	1,2,3	1,2,3	1,2
Pioneer DVR-A05 4X	1,2,3,4,5	1,2,3	1,2,3,4,5	1	1,2,3,4,5	1	1,2,3(a), 4,5	1,2	1,2,3,4,5	1,2,3	1,2(b)	1,2(d)
Sony DRU-500A (with 4X update)	1,2,3,4,5	1,2,3(a,c)	1,2,3,4,5	1	1,2,3,4,5	1	1,2,3,4,5	1,2	1,2,3,5	1,2,3(a)	1,2	1,2
Toshiba SD-R5002 2X	1,2,3,4,5	1,2,3(a)	Failed to burn	1	1,2,3,4,5	1	Failed to burn	1,2	Not tested	1,2,3	1,2	1,2

DVD+RWs	Maxell DVD+R 2.4X	Maxell DVD+RW 2.4X	Memorex DVD+R 2.4X	Memorex DVD+RW 2.5X	TDK DVD+R 2.4X	TDK DVD+RW 2.4X	Ritek DVD+R 2.4X	Ritek DVD+RW 2.4X	Optodisc DVD+R 2.4X	HP DVD+R 2.4X	HP DVD+RW 2.4X
Memorex 2.4X	1,2,3,5	1,2,3(a)	1,2,3(c),5	1,2,3(a)	1,2,3,5	1,2(b)	1,2,3,5	1,2,3(a,d)	1,2,3(a)	1,2,3(d),5	1,2,3(a)
HP dvd300i 4X	1,2,3,5	1,2	1,2,3,5	1,2,3	1,2,3,5	1,2,3(d)	1,2,3,5	1,2,3	1,2	1,2,3(d),5	1,2
Plextor PX-504A 4X	1,2,3,5	1,2,3	1,2,3,5	1,2	1,2,3,5	1,2(a)	1,2,3,5	1,2	1,2	1,2,3,5	1,2,3
Sony DRU-500A with 4X update	1,2,3,5	1,2	1,2,3,5	1,2,3(a)	1,2,3,5	1,2	1,2,3,5	1,2,3(a)	1,2	1,2,3,5	1,2,3(a)
TDK Indi 420N 4X	1,2,3,5	1,2,3(a,c)	1,2,3,5	1,2,3(a)	1,2,3,5	1,2,3(a)	1,2,3,5	1,2,3(a)	1,2	1,2,3,5	1,2

Home players: 1) Toshiba SD-310V (2002); 2) APEX AD-1500 (2002); 3) GE 1105P (2000); 4) Sansui SDVD2000 (1999); 5) Denon DVD-3000 (1998)

Comments: a) long load time; b) no play on first attempt; c) slight stutters; d) major stutters

NOTES: The Sony DRU-500A supports both DVD-R/RW and DVD+R/RW formats. Optodisc DVD+R media was unavailable at this writing.

CenDyne DVR-105 DVD-RW

DVD speeds	4X/2X/12X
CD speeds	16X/8X/32X
Firmware version	1.00
Cache buffer (MB)	2
4GB R burn time (min:sec)	15:22 (Pioneer 4X)
4GB RW burn time (min:sec)	25:32 (Pioneer 2X)
Average read rate (1X=1.35MBps)	9.02X, CAV
End read rate	11.90X, CAV
Burst rate (MBps)	20.67
Random access (ms)	137
Full-stroke access (ms)	330
Notable formats read	DVD-R/RW, CD-R/RW, CD-Text, VCD
Notable formats written	DVD-R/RW, CD-R/RW, RAW-SAO, RAW-DAO
CPU rating	4
URL	www.cendyne.com
Price	\$279

CenDyne DVR-105 4X DVD-RW

The CenDyne DVR-105 is based on the Pioneer DVR-A05 (the "A" and "1" indicate only cosmetic differences), which has its own spot in this roundup. It may seem like we're treading old ground, but we're not. In the CD-RW arena, CenDyne rebrands Lite-On's excellent drives, yet we review both because CenDyne's versions sometimes outperform the originals in our tests.

This CenDyne was no different. It was the fastest R burner in this roundup, taking just 15:22 (minutes:seconds) to burn 4GB to DVD-R. That's two seconds faster than the Addonics AEDVDCOP4UM DigiCopier, which is also based on the Pioneer DVR-A05. The CenDyne was even the second fastest RW burner (25:32) to burn 4GB to DVD-RW, half a minute behind the Sony DRU-500A's DVD+RW time after the Sony's firmware update enabled 4X DVD+R burn speeds.

The CenDyne even beat the band in average and end-of-disc read rates, according to

Nero DVD Speed. Using CAV read mode, this lil' hottie racked up 9.02X average and 11.90X end read

rates. A 1X rating in the DVD kingdom means 1.35MBps as opposed to 0.15MBps in CD-RW lingo, so 11.90X means 16.07MBps.

This drive didn't choke on any of the discs we asked it to burn, from big names, such as Maxell and Memorex, to less expensive online bargains, such as Ritek and Optodisc. Only its Ritek DVD-RW had a bit of trouble playing the first time we inserted it into our APEX AD-1500 player, but it played fine on the second attempt.

The CenDyne comes with interVideo WinDVD, Sonic MyDVD, and Nero Express. It has a one-year warranty.



Media Compatibility

We're all for fast burn times, but we're even more interested in the quality of the resulting discs. So what's better to have in the long run, + or -, R or RW? Which is more compatible with consumer players, which is considered the acid test for a DVD format?

"I've actually gone to Circuit City and taken a + and a - disc and, with rare exception, they all pretty much work," says Sony marketing manager Bob DeMoulin. "I think it's the legacy installed base of pre-1998 players; that's where it gets a little spotty."

The inescapable conclusion from our compatibility tests is that it's actually more important to buy the right DVD player than the

right drive or media. The Toshiba SD-310V makes that clear. This 2002-vintage player recognized and played every disc we fed it, showing that each drive could produce playable DVD-Video discs with nearly every brand and type of media. There were a few coasters, however, most of which ironically came from Toshiba's SD-R5002 DVD-RW. Bravo to Toshiba for at least a player well done.

As for media, the formats most compatible with home players in our tests were DVD-R, DVD+R, DVD-RW, and DVD-RW, in that order. DVD-R is still the most universally accepted recordable format overall, but DVD+RW is apparently best for rewriteable discs, especially in

newer players. If you're looking for a VCR replacement, DVD+RW seems to be it.

One surprise was the dismal performance of Memorex and TDK DVD-RW media. DVD-RW was never really intended for video players, but with only the Toshiba SD-310V player able to recognize these brands, shame on Memorex and TDK. And while we're dishing out hitsies, shame on Sansui for a player that couldn't handle anything with a + sign.

The best advice we have for buying a DVD player is that the newer, the better. If you're making do with a unit that's a year or two old, get a dual RW drive and burn DVD-Rs and DVD+RWs with it.



HP dvd300i DVD+RW

DVD speeds	4X/2.4X/8X
CD speeds	16X/10X/40X
Firmware version	1.25
Cache buffer (MB)	2
4GB R burn time (min:sec)	16:55 (HP 4X)
4GB RW burn time (min:sec)	25:45 (HP 2.4X)
Average read rate (1X=1.35MBps)	8.42X, P-CAV
End read rate	10.62X, P-CAV
Burst rate (MBps)	0.9
Random access (ms)	128
Full-stroke access (ms)	201
Notable formats read	DVD±R/RW, CD-R/RW, CD-Text, VCD
Notable formats written	DVD±R/RW, CD-R/RW, RAW-SAO, RAW-DAO
CPU rating	3.5
URL	www.hp.com
Price	\$299.99

HP dvd300i 4X DVD+RW

Critics and advocates alike saw time slipping away from the DVD+RW Alliance as the DVD-R/RW format enjoyed a long head start. And after the DVD+RW format finally did make its debut, HP and other



manufacturers caught some egg on their faces when their early drives couldn't be upgraded to use write-once DVD+R media as promised.

Still, even after these delays and setbacks, DVD+R/RW is expanding its presence. Imagine our surprise when we checked Best Buy and Circuit City shelves in mid-February and found far more DVD+R/RW blank media than DVD-R/RW and DVD-RAM combined.

The dvd300i internal drive is HP's 4X/2.4X/8X DVD+RW model with

16X/10X/40X capabilities as a CD-RW. It had absolutely no problems burning DVD+Rs, in case you're wondering. Two discs it burned didn't play very well in our General Electric 1105P DVD player (made in 2000), but the GE had trouble with all four varieties of DVD±RW. In this case, the HP's TDK 2.4X DVD+RW and HP 2.4X DVD+R stuttered in a big way in the GE.

The HP's write performance was middle of the road, with respectable 16:55 4GB DVD+R and 25:45 DVD+RW burn times. However, the dvd300i showed its mettle with quick access times and top-tier read rates. It comes with CyberLink PowerDVD playback and ArcSoft ShowBiz DVD authoring software, but it skips the usual Roxio or Ahead Software alliance in favor of Veritas burning titles, such as RecordNow, DLA, and SimpleBackup. The drive uses Just Link buffer underrun protection and has a one-year warranty.

Memorex ReWritable Drive

DVD speeds	2.4X/2.4X/8X
CD speeds	12X/10X/32X
Firmware version	1.27
Cache buffer (MB)	2
4GB R burn time (min:sec)	28:53 (HP 2.4X)
4GB RW burn time (min:sec)	31:44 (Memorex 2.5X)
Average read rate (1X=1.35MBps)	2.74X, CAV
End read rate	3.62X, CAV
Burst rate (MBps)	0.48
Random access (ms)	214
Full-stroke access (ms)	382
Notable formats read	DVD±R/RW, CD-R/RW, CD-Text, VCD
Notable formats written	DVD±R/RW, CD-R/RW, RAW-SAO, RAW-DAO
CPU rating	1.5
URL	www.memorex.com
Price	\$379.99

Memorex DVD+RW/+R Internal ReWritable Drive

Memorex is one of several companies that rebrands DVD+RW drives based on the reliable Ricoh 2.4X mechanism. The next generation, based on a 4X DVD+R write engine, is still a few months off, Memorex says. In the meantime, this burner continues to chug along with its 2MB buffer and Just Link buffer underrun protection, offering sedate 2.4X/2.4X/8X DVD+RW and 12X/10X/32X CD-RW speeds.

As expected, the Memorex didn't set any new speed records in our benchmarked or timed tests. It beat only the Toshiba SD-R5002 DVD-RW in our 4GB burning tests with 28:53 DVD+R and 31:44 DVD+RW

write times. The beleaguered Toshiba fought back

with read rates and access times nearly twice as fast as the hapless Memorex's. The Memorex only logged a 3.62X top read rate near the outer edge of our test DVD-ROM. Sure, you only need a 1X player to watch a movie, but we'd like something a bit livelier when accessing our backup discs or .NET installation DVDs.

Our truculent GE 1105P DVD player hated most of the discs the Memorex burned. The GE took a long time to load several of the DVDs and stuttered or froze on a few. Even the newer APEX balked a little at this drive's TDK DVD+RW, only playing it on the second attempt.

Memorex bundles a solid, fat-free software package, including Ahead Nero, ArcSoft Showbiz, Sonic MyDVD, and CyberLink PowerDVD. The drive carries a one-year warranty. This 2.4X Memorex may not stack up very well to the 4X DVD±RW pack anymore, but look for much more competitive prices online. That \$379.99 price Memorex quoted us at press time doesn't reflect the current state of competition.



Pioneer DVR-A05 DVD-RW

DVD speeds	4X/2X/12X
CD speeds	16X/8X/32X
Firmware version	1.00
Cache buffer (MB)	2
4GB R burn time (min:sec)	18:41 (Pioneer 4X)
4GB RW burn time (min:sec)	31:40 (Pioneer 2X)
Average read rate (1X=1.35MBps)	6.12X, CAV
End read rate	8.08X, CAV
Burst rate (MBps)	20.76
Random access (ms)	141
Full-stroke access (ms)	316
Notable formats read	DVD-R/RW, CD-R/RW, CD-Text, VCD
Notable formats written	DVD-R/RW, CD-R/RW, RAW-SAO, RAW-DAO
CPU rating	3.5
URL	www.pioneer-electronics.com
Price	\$299.95 (online price)

Pioneer DVR-A05 4X DVD-RW

Pioneer makes the most seminal DVD-RW drives in a shrinking circle of manufacturers. Its wildly popular models are eagerly awaited by fans worldwide, and companies such as CenDyne, Addonics, and TEAC often repackage them.

Despite Pioneer's audio roots, the company declined to add a digital audio output to the DVR-A05. It did endow it with a standard 2MB cache buffer and the ability to burn any brand of media we wanted. This drive does DVD-R/RW at 4X/2X/12X speeds and doubles as a 16X/8X/32X CD-R/RW writer.

Children can be so ungrateful. Even though the Pioneer spawned CenDyne's DVR-105 and Addonics' DigiCopier, the latter drives two whipped their old man in our 4GB timed-transfer tests. The Pioneer

showed up late to the party with a sixth-place 18:41 DVD-R burn time and a seventh-place DVD-RW result of 31:40. Even more insulting, the DVR-A05 logged these times using Pioneer's own brand of media. Whoops.

Of course, the quality of the finished disc means more than how long it took to burn, and the Pioneer led the way in DVD-Rs that every player could read. Among the players that did play the Pioneer's discs, only the APEX had real problems with Princo media. The GE player took a long time to load the Pioneer's Ritek DVD-R, but no surprises there.

The Pioneer was also a slower reader overall than most of the drives we tested, but it did beat the Sony with 6.12X average and 8.08X end-of-disc read rates (CAV mode). Finally, its competitive random access time of 141ms helps us overlook the Pioneer's not-so-competitive full-stroke access time of 316ms. It has a one-year warranty when you buy it through an authorized Pioneer dealer.

One note for previous Pioneer customers: If you have a DVR-A03 or DVR-A04, read our "Pioneer's 4X Embarrassment" sidebar in this article for information that could save your drive.

**U p c o m i n g D r i v e s**

A list of nine drives is impressive, but it isn't all the drives we wanted. The Tritton Viper (\$327 and up; www.trittonsales.com) has been a popular request, primarily because of its 321 Studios DVD X Copy software bundle. The Viper hasn't arrived at this writing despite our requests over the last two months.

We're also waiting for TDK's Indi 440 dual RW, due in April for about \$299.99. It will write DVD+R and DVD-R at 4X.

Meanwhile, Ricoh's 4X DVD+RW mechanism will make possible the release of new drives from Memorex and others early this summer.

Sony's Bob DeMoulin says that's not all. "Just looking ahead to the future, the +RW Alliance already has on the drawing board the plans for 8X +RW. That might come late this year; it's kind of unclear yet when the actual products might come out," he says. "You've got guys like Philips out there already saying,

'Hey, we've already got chipsets that are ready for 8X.'

"The media is really going to be the limiting factor," DeMoulin says. "At that speed, you're spinning that disc so fast that the media technology—being able to make a byte-sized mark on the disc at those speeds when you're exposing the media to very short bursts of light, and also the flatness of the disc—becomes very important. . . . I think that's what's going to take the time

to develop. The drive technology is pretty straightforward."

Finally, the momentum of DVD-RW/-RAM drives and dual RWs is rushing toward the real summit: drives that support all three rewriteable DVD formats. One example is LG Electronics' upcoming DVD-RW/+RW/-RAM, expected in April. The tentatively titled GMA-4040B will write DVD-R and DVD+R at 4X speed, as well as bare DVD-RAM discs, according to LG (www.lgeus.com).

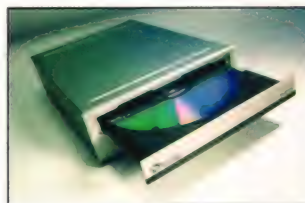
Plextor PX-504A 4X DVD+RW

DVD speeds	4X/2.4X/12X
CD speeds	16X/10X/40X
Firmware version	0.aa
Cache buffer (MB)	2
4GB R burn time (min:sec)	17:38 (Verbatim 4X)
4GB RW burn time (min:sec)	25:39 (Memorex 2.5X)
Average read rate (1X=1.35MBps)	8.44X, CAV
End read rate	11.14X, CAV
Burst rate (MBps)	0.9
Random access (ms)	127
Full-stroke access (ms)	205
Notable formats read	DVD±R/RW, CD-R/RW, CD-Text, VCD
Notable formats written	DVD±R/RW, CD-R/RW, RAW-DAO
CPU rating	3
URL	www.plextor.com
Price	\$299

Plextor PX-504A 4X DVD+RW

This article nearly had just eight competitors, but Plextor wouldn't be denied. The innovative CD-RW favorite sent us a preproduction version of its first rewriteable DVD drive, the PX-504A. This 4X/2.4X/12X unit falls squarely into the DVD+RW camp, giving the +RW Alliance a big feather in its cap.

Despite the drive's alarmingly immature-sounding firmware version number (0.aa), the Plextor wowed us with fast reads and quick accesses. According to Nero DVD Speed, the PX-504A soared with 8.44X average and 11.14X end-of-disc read rates. A 127ms random access time and a 205ms full-stroke access result round out these impressive read speeds. Look for extremely similar results from the TDK Indi 420N.



When it comes to 4GB folder writing speeds, the Plextor perches on the middle of the curve. Its 17:38 DVD+R time was good enough for fifth-place overall, while its 25:39 elapsed time put it in fourth place

in the competition of + and -RWs. Plextor's famous black transfer mechanism tray aids accurate data transfer by reducing the distortion of the laser, the company says, while Plextor's own brand

of buffer underrun protection backs up the drive's 2MB buffer.

Among other nice features in the PX-504A are a digital audio output jack, a Roxio-based software bundle, and 16X/10X/40X CD-RW speeds. Plextor backs the drive with a one-year warranty and the company's famous unlimited toll-free tech support.

Addonics DigiCopier AEDVDCOP4UM 4X DVD-RW

Here's an interesting use for a Pioneer DVR-A05: Stick it in a standalone disc duplicator. Yes, you can dupe CDs and nonprotected DVDs with the attractive Addonics without a connection to a PC, as long as you flip a switch in the back of the unit first. The Addonics automatically disables its secondary DVD-ROM drive

when you connect the unit to a PC. Unfortunately, our sample unit came with some internal connections crossed, and we had to call Addonics' tech support for help before we could use it.

We cover the Pioneer drive in this article, so we won't snow you under with specs. However, it's worth noting that, like the CenDyne incarnation of the DVR-A05, the Addonics also beats the Pioneer in DVD-R/RW burn times. This duplicator actually was the second fastest DVD±R burner here with a 15:24 DVD-R time and the sixth fastest DVD±RW writer with a 26:22 DVD-RW, all over a USB 2.0 connection, not ATAPI.

It's still a thorny question whether you can make a backup copy of a copyrighted movie DVD that you own, but you can't do it with the Addonics' bundled software anyway. The unit comes with Nero and PowerDVD titles. In any case, movie DVDs are typically 9.4GB dual-layer discs and would likely require two of the 4.7GB single-layer blank DVDs available off the shelf.

Interestingly, Addonics recommends Sony, Pioneer, LEDA, and GQ blank media. It also singles out FujiFilm and Maxell as brands to avoid. However, in our tests, neither FujiFilm nor Maxell media failed to burn in any of the DVR-A05-based drives. In addition, the FujiFilm DVD-Rs played fine in all five DVD home players, while the Maxell DVD-RWs had average compatibility here. However, the Addonics did fail to burn a Princo DVD-R 2X in our tests.

The Addonics comes with a one-year warranty. Other proprietary adapter cables for interfaces, such as FireWire and PC Card, are available on Addonics' site.

**Addonics DigiCopier AEDVDCOP4UM DVD-RW**

DVD speeds	4X/2X/12X
CD speeds	16X/8X/32X
Firmware version	1.00
Cache buffer (MB)	2
4GB R burn time (min:sec)	15:24 (Pioneer 4X)
4GB RW burn time (min:sec)	26:22 (Pioneer 2X)
Average read rate (1X=1.35MBps)	7.92X, CAV
End read rate	11.54X, CAV
Burst rate (MBps)	10.69
Random access (ms)	137
Full-stroke access (ms)	405
Notable formats read	DVD-R/RW, CD-R/RW, CD-Text, VCD
Notable formats written	DVD-R/RW, CD-R/RW, RAW-DAO, RAW-DAO
CPU rating	3
URL	www.addonics.com
Price	\$659

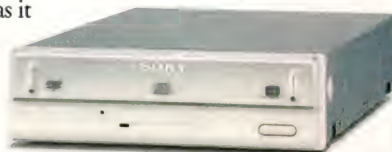
Sony DRU-500A Dual RW

DVD speeds	4X/2X/8X DVD-RW, 4X/2.4X/8X DVD+RW (as tested)
CD speeds	24X/10X/32X
Firmware version	1.0f
Cache buffer (MB)	8
4GB R burn time (min:sec)	15:34 DVD+R (Sony 4X), 20:31 DVD-R (Pioneer 4X)
4GB RW burn time (min:sec)	24:58 DVD+RW (HP 2.4X), 30:42 DVD-RW (Pioneer 2X)
Average read rate (1X=1.35MBps)	5.64X, CAV
End read rate	7.45X, CAV
Burst rate (MBps)	16.12
Random access (ms)	196
Full-stroke access (ms)	320
Notable formats read	DVD±R/RW, CD-R/RW, CD-Text, VCD
Notable formats writ- ten	DVD±R/RW, CD-R/RW, RAW-SAO, RAW-DAO
CPU rating	4
URL	www.storage bysony.com
Price	\$349.99

Sony DRU-500A Dual RW

Many DVD-ROM drives and newer home players can read any type of DVD±R/RW disc, but only a select few can *burn* both DVD-R/RWs and DVD+R/RWs. Sony was the first to secure this auspicious terrain, so we'll use the company's "dual RW" appellation when talking about this genre of drive. The DRU-500A made a lot of potential DVD drive buyers sit up and take notice, as it effectively rendered the DVD-RW/DVD+RW conflict moot.

Sony says its new DRU-500AX drive is nothing more than the older DRU-500A with a firmware update, plus a Veritas and Sonic Solutions software bundle on CD instead of via download. You can get the new firmware, version 1.0f, at sony.storagesupport.com/freupgrade. Besides upgrading the DRU-500A to 4X DVD+R write speeds, Sony says the update improves read speeds somewhat. Ultimately, the DRU-500A becomes a 4X/2X/8X DVD-RW, a 4X/2.4X/8X DVD+RW, and a 24X/10X/32X CD-RW.



Version 1.0f also improves recording on imperfect media. "We can't name names," says Bob DeMoulin, marketing manager for branded storage products in Sony Electronics' IT products division, about which brands of media were less than stellar. "One thing that you can say is that the name-brand media, like Sony or Verbatim, those kind of guys are OK. It's some of the off brands. . . ." We should mention that some name brands (Memorex and TDK) didn't look so hot in the DVD-RW side of our compatibility tests, while the lesser-known Ritek and Optodisc did better.

The DRU-500A has the only 8MB buffer in this crowd, which helped it take top honors among DVD±RWs with a 24:58 DVD+RW/4GB burn time and third DVD±R place with a 15:34 DVD+R. Its read rates and access times were more ho-hum, but there's no denying this drive's exceptional flexibility. The only thing it can't do is DVD-RAM, but see our "Upcoming Drives" sidebar for a future dual RW that can.

TDK Indi 420N DVD+RW

DVD speeds	4X/2.4X/12X
CD speeds	16X/10X/40X
Firmware version	1.36
Cache buffer (MB)	2
4GB R burn time (min:sec)	26:59 (TDK 4X)
4GB RW burn time (min:sec)	25:34 (TDK 2.4X)
Average read rate (1X=1.35MBps)	8.44X, CAV
End read rate	11.14X, CAV
Burst rate (MBps)	0.9
Random access (ms)	126
Full-stroke access (ms)	210
Notable formats read	DVD±R/RW, CD- R/RW, CD-Text, VCD
Notable formats written	DVD±R/RW, CD-R/RW, RAW-SAO, RAW-DAO
CPU rating	3
URL	www.tdk.com
Price	\$349.99

TDK Indi 420N 4X DVD+RW

"Indyyyyyyyy!" OK, it was more fun to hear Karen Allen scream that in "Raiders Of The Lost Ark" than Short Round in the next Indiana Jones flick, but in this Indi's case, you'll definitely want to see the sequel. TDK's Indi 420N DVD+RW is nice enough, but we're more excited about the upcoming 440 (see our "Upcoming Drives" sidebar for more).

The 420N is the only burner we've seen with a bad Bigfoot impersonator on its box. The drive is a virtual twin to the Plextor PX-504A, with a 2MB buffer, 4X/2.4X/12X DVD+RW ratings, and 16X/10X/40X CD-RW speeds. One difference is the TDK took nearly 10 minutes longer time to burn 4GB to DVD+R (26:59), which could either be firmware discrepancies or the difference between TDK and Verbatim media. For the record, TDK's DVD+R/RW discs

didn't seem any more or less compatible than other media in the + camp, unlike its horrific DVD-RWs (and Memorex's, which appeared to have the same recording dye).

This TDK's 4GB burn times looked like a spare in a bowling lane, with a third-place DVD+RW time of 25:34 and a seventh-place finish in DVD+R at 26:59. The latter looks more like a 2.4X burn time to us, but hey, it was TDK's own 4X media, after all.

The Indi 420N has a digital audio output, a 2MB buffer, and very nice 8.44X average and 11.14X end-of-disc read rates. Its DVD+RWs seemed to have longer load-

ing times than the Plextor's in several players, but the Indi's DVDs generally played in the GE 1105P while the Plextor's usually didn't.

TDK bundles Nero Express and Pinnacle Studio 8se software, and it also includes a one-year warranty.



Toshiba SD-R5002 DVD-RW

DVD speeds	2X/1X/12X
CD speeds	16X/10X/40X
Firmware version	1030
Cache buffer (MB)	2
4GB R burn time (min:sec)	32:24 (Ritek 2X)
4GB RW burn time (min:sec)	57:39 (Ritek 1X)
Average read rate (1X=1.35MBps)	8.59X, P-CAV
End read rate	6.61X, P-CAV
Burst rate (MBps)	1.57
Random access (ms)	114
Full-stroke access (ms)	229
Notable formats read	DVD-R/RW, CD-R/RW, CD-Text, VCD
Notable formats written	DVD-R/RW, CD-R/RW
CPU rating	1
URL	sdd.toshiba.com
Price	\$299 (kit)

Toshiba SD-R5002 2X DVD-RW

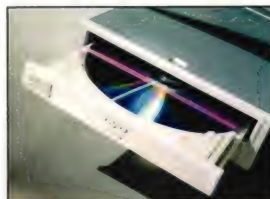
Toshiba wouldn't tell us what rewriteable DVD drives it has in development, but it did send us its aging SD-R5002. The drive wasn't a bad reader, but as we expected from its 2X/1X/12X DVD-RW speeds, it didn't exactly burn the house down in our, um, burning tests.

Someone had to finish last, and this Toshiba obligingly took it on the chin in both DVD±R and DVD±RW 4GB burn tests. Its 32:24 DVD-R and 57:39 DVD-RW write times bring to mind all those 2X and 1X burns our testers loathed to clock last year. Even worse, the Toshiba further distinguished itself by being the only drive that failed to burn two discs (the Pioneer-based Addonics choked on a Princo DVD-R). It made a Ritek DVD-R coaster and two Memorex DVD-R frisbees before we put

it out of its misery. We ran out of Optodisc DVD-Rs before we could try one in the Toshiba, but it was probably just as well.

The good news was the drive's 8.59X average read rate and its tight 114ms random and 229ms full-stroke access times. What's more, almost none of the players that could read its discs had any trouble with them, besides the GE's delay with the Maxell DVD-RW, that is.

The SD-R5002 has a 2MB buffer and a one-year warranty. It breaks away from Nero and Roxio with VOB Instant CD/DVD software and CyberLink's PowerDVD and PowerDirector Pro. We can't recommend this drive, but we're anxious to see what's next from Toshiba. After all, it made the killer SD-310V player that could do no wrong.



Pioneer's 4X Embarrassment

Can you really hurt a DVD drive by feeding it commercially available media? Unfortunately, yes, if you have a Pioneer DVR-A03/103, DVR-A04/104, DVR-7000, or PRV-9000 (www.pioneerelectronics.com/hs). Pioneer says these drives and recorders can damage and be damaged by 4X DVD-Rs or 2X DVD-RWs until you install a free firmware update. The DVR-A05 isn't affected.

The problem is that the drives in question can't recognize the recording instructions on the high-speed media, according to Pioneer senior vice president Andy Parsons, so they keep trying and trying. "This results in a 'lock-up' condition that, if allowed to continue for too long, can overheat the lens and damage

the optical coating on its surface," he says. "We have found that some drives may overheat the lens in as little as five minutes, while others may take longer. Once the lens coating has been damaged, the optical pickup can no longer function correctly and discs cannot be written or read."

A DVR-A03/103 requires firmware version 1.90 or later to fix the vulnerability, and a DVR-A04/104 needs version 1.32 or later. Note that these updates won't allow an older drive, such as the DVR-A03, to write at speeds above its design. Pioneer offers a firmware checker utility to help you find out what version your drive has.

Memorex makes all three types of blank DVD media,

so it has some further insight. Technical marketing manager Terry O'Kelly says there have been challenges with both azo-cyanine DVD-R and metal chelate DVD±R 4X media. One is the disc recognition problem Parsons mentioned, he says. "(Another is) using the original laser power and burst strategy for 2.4X discs for 4X discs that require a different strategy, (as in) DVD±R discs and early DVD±R/+RW recorders."

"Pioneer will honor the warranty terms for any Pioneer-branded product affected by this problem," and inadvertently damaged, Parsons says, but owners of rebranded drives should consult the company on the drive's label for service.

CAVing Season

Like CD-RW drives, rewriteable DVD drives may use different modes of spindle speed management for reading and writing. A drive using CLV (constant linear velocity) slows its rotation as its heads travel to the outer edges of the disc, yielding a relatively constant data-transfer rate. A drive using CAV (constant angular velocity) will spin at the same rpm no matter where its heads are, which means it will read more data per second the closer it gets to the disc's outer edge. A drive may even use a combination of CLV and CAV, such as P-CLV (partial-CLV), P-CAV, Z-CLV (zoned-CLV), and/or Z-CAV. Some of these hybrid modes are more efficient than CAV or CLV and allow higher average read or write rates.

A drive's read/write methods may also vary with the type of media. For example, Pioneer says that its DVR-A05 uses 6X CAV to play "high-speed" media (4X DVD-Rs and 2X DVD-RWs) and 2X CLV to play back other types of media. In addition, a drive will read 9.4GB dual-layer DVDs, such as DVD-Video movie discs, more slowly than single-layer 4.7GB media.

Coaster Guard

You don't hear much about buffer underrun prevention anymore. A few years ago, Sanyo's BURN-Proof and its technological followers became must-have features in CD-RW drives, but today, everyone just assumes a new CD-RW or DVD burner has one of them. And that's the way buffer underrun prevention should be: standard on every drive.

Basically, BURN-Proof, Ricoh's Just Link, and even Plextor's Buffer Underrun Proof operate pretty much the same. You may have to enable them in your burning software's settings with some drives, but that's about it. Each drive has a 2MB or 8MB cache buffer that smoothes out the

incoming data coming from the computer before it writes it to a blank disc. If the data lags behind and the drive senses its buffer is emptying, it will stop writing until the data starts to flow again. The result is a valid, finished disc, not a ruined "coaster" like the ones older burners often produced.

Fortunately, both DVD±RW formats have lossless linking schemes, meaning they can handle the ending of one data chunk and the beginning of another without much, if any, interruption in between. This becomes critical during video playback on many consumer DVD players. Besides facilitating buffer underrun recovery, DVD±RW's precise lossless

linking even allows video editing directly on a prerecorded rewriteable disc with certain software.

So how does a larger cache fit in? Doesn't buffer underrun prevention make a cache unnecessary? Perhaps, but a large cache of 8MB will keep a drive writing after a 2MB cache runs dry and will need to invoke buffer underrun prevention less often. The result is faster burns under less than optimal conditions with an 8MB cache drive. Of course, neither size of cache will help when the stream of data dries up and doesn't come back.

Sony's Power-Burn adds some recording management to its buffer underrun protection duties,

says Sony marketing manager Bob DeMoulin. "If it senses the buffer is getting below a certain threshold, it will actually slow down the recording to allow the buffer to catch back up again, and it will spin it back up to full speed," he says.

"For the average Joe, that doesn't really mean anything, but if you're making a disc to go into replication, it means a lot," DeMoulin says. "Because if a replicator gets a master (disc) and they find these link blocks (markers between stopped and resumed data), they come up with what's called 'E32s,' uncorrectable errors. And if a replicator sees those, they generally reject the master."

Hey, What About . . . ?

Despite our nine rewriteable DVD drives, eight brands of media, five consumer players, and roughly 130 burned discs, we still don't consider this a totally comprehensive test. If we could have tried every DVD drive and recorder, every brand and speed of media, every benchmark utility, and every consumer DVD player in the world, and then let our hardware and media age for a few years for reliability statistics, we could thump our chests a bit.

We'll be the first to admit that there are scores of variables in tests like these. For example, a given drive may write DVDs more quickly with different burning software or even a slightly different version of Nero. A particular brand of DVD+R may play well in one brand's flagship DVD player but not the model next to it in the lineup. And any drive may have broader compatibility with media after a firmware update and could be faster or even slower. This

doesn't even mention the subtle variations from drive to drive, even among identical brands with identical firmware from the same production lot. Finally, there was no way we could have watched all 111 DVD-Video discs in their entirety on all five DVD players, so certain media may have contained glitches later in the video that we didn't see.

Several sites, such as DVDR Help.com, CDR Labs.com, and CDR Info.com, have lively forums

dedicated to these questions. Besides offering troubleshooting help, these forums are good sources of media compatibility experiences, firmware update cautionary tales, and even online coupon and free shipping info. As with any forum, don't rely on any single poster's love or hatred of a particular brand for your buying decision. Your mileage may vary, so take another user's experiences—even ours—for what they're worth.

Final Thoughts

Basing our opinions on performance and compatibility more than other factors, we came up with a few recommendations for your next rewriteable DVD drive. The kind of software bundled with a drive takes a secondary role here; we would rather get the best drive we can and then outfit it with Nero and Ulead later, if necessary. Also, we can only gauge a drive's reliability and its manufacturer's support by our own experiences, but don't let that stop you from checking forums such as DVDR Help.com, CDR Labs.com, and CDR Info.com before you buy.

Our choice for a straight-up DVD-RW is the CenDyne DVR-105; it outperformed its Pioneer daddy in reading and writing while offering similar compatibility among DVD players. Our pick for a DVD+RW, and top pick overall, is the Sony DRU-500A after the 1.0f firmware update (DRU-500AX). With more dual RWs and even triple-DVD drives on the way, it's getting harder to recommend drives that can only write one DVD format. (Go to www.cpumag.com/cpuapr03/dvds for our "DVD+R/RW vs. DVD-R/RW" sidebar.) **CPU**

by Marty Sems

Make The Move To DVD

*Breathe New Life
Into Your Videos*

You know that embracing DVD technology for all of your video needs makes a lot of sense. DVDs don't require the same storage space as videotapes, you already have a DVD player, and you're buying new movies on DVD. But you just can't abandon your VHS player completely. You have a collection of personal videotapes that you can't part with. Then there are the tapes from your old analog camcorder that you need to keep.

The process of converting all of your analog video to a digital format and to DVD isn't as daunting as it might seem.

DVD burners for your computer are approaching

a reasonable price point, and you have plenty of options for hardware and software that can convert analog video to DV.

What You'll Need

To perform the conversion process from analog video to DV, you must have the right equipment.

DVD burner. Obviously, having a fast, reliable DVD burner is a key to hassle-free DVD creation. For this article, we used the DEx DVD-RW external USB 2.0 drive from Archos (\$279; www.archos.com) and an internal model, the DVD-R/RW Writer DVR-A05 from Pioneer (\$299; www.pioneerelectronics.com).

When selecting a DVD burner, you'll not only have to choose between external and internal, but you'll also want to choose a model that can create DVDs that are compatible with your standalone DVD player. Visit www.vcdhelp.com/dvd players for a list of DVD format compatibility for various brands and models of DVD players.

Once you select a

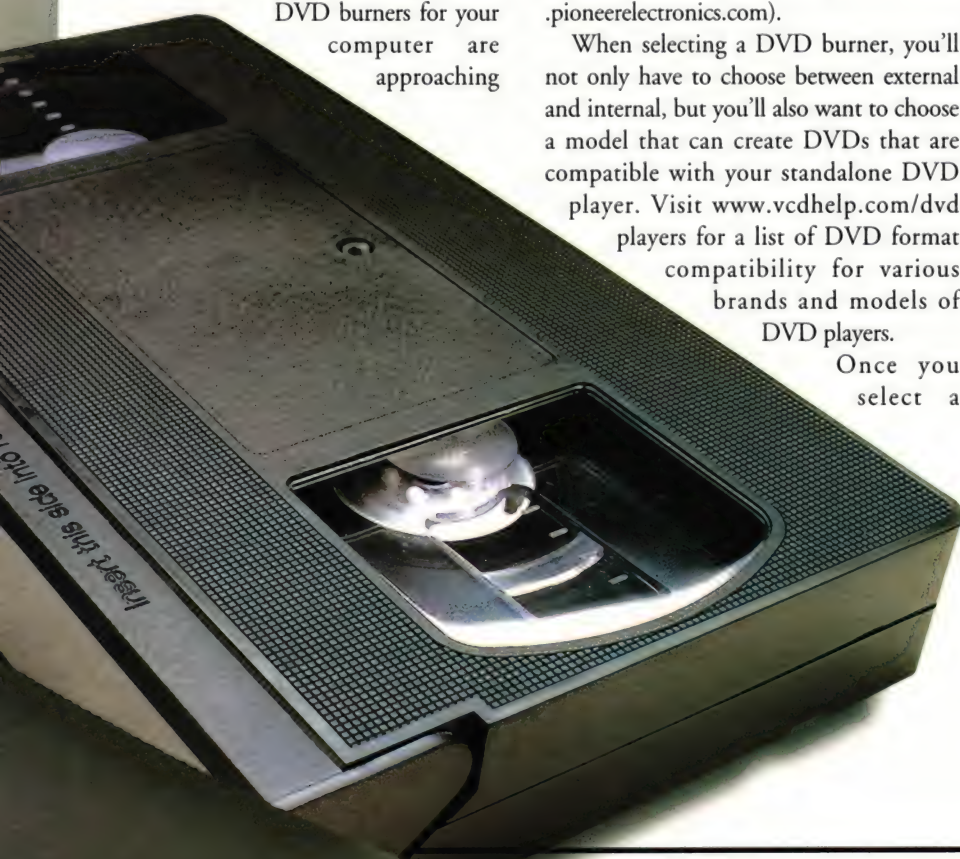
DVD burner, you'll need to select compatible media. DVD-R and DVD+R are the competing formats for both write-once and rewriteable DVD media. Write-once media costs about \$3 to \$4 per blank disc; rewriteable media costs about \$5 to \$7 per blank disc.

Video and audio capture. When capturing video and audio from an analog source, you have a couple of options. First, if you have a graphics card that can capture analog video and software that can convert analog video, you're in good shape. The card should have an RCA composite video input plug or an S-Video input plug on the back. You'll then need to capture the audio through your PC's sound card, probably using an RCA stereo plug.

To simplify things—or if you don't have hardware capable of capturing audio and video—you could choose an external video and audio capture device like the ones available from such companies as Dazzle /SCM Microsystems and Pinnacle Systems. For this article, we'll use the Dazzle Hollywood DV-Bridge, which automatically converts analog video to digital video before it reaches your PC's hard drive. It really makes the conversion process easy.

DVD authoring software. To put the finishing touches on your video, DVD authoring software can help you with a variety of tasks, from capturing and converting the analog video to editing and organizing the clips to adding special effects and text to burning the project to DVD. We've listed several options at varying price points in the "Top DVD Authoring Packages" sidebar.

System requirements. You won't advance too



far in this process with an older Windows computer. Minimum system requirements include a 600MHz Pentium III processor (a Pentium 4 processor would be better), 128MB of RAM, DirectX 8, a FireWire (IEEE 1394) connection, a USB 2.0 connection, 1,024 x 768 video resolution, and 1GB or more of hard drive space for storing DVD authoring software and video clips. In other words, you're going to need a newer computer.

Capture Analog Video

With equipment in hand and after plugging in the VCR near the computer, you're ready to start. (Because we could watch the video through the DVD authoring software, we didn't hook the VCR to a TV for the conversion process.)

Our first step was to plug in the Hollywood DV-Bridge hardware and then connect standard yellow, red, and white RCA video and audio plugs to the input area on the front of the DV-Bridge hardware (Figure 1). Then we plugged the other end of the RCA cord into our VCR. Because we have an older VCR with a mono audio plug, we had to add an audio Y splitter to the mono plug to accommodate the stereo audio plug that the DV-Bridge requires. We then attached the FireWire cable to the output area on the back of the DV-Bridge and to the PC to complete the hardware setup.

After installing and opening our DVD authoring software—in this case, we used Dazzle's DVD Complete—we were ready to begin converting the analog video to

DV. After starting a new project, we told the software we wanted to perform a video capture (Figure 2). DVD Complete found the VCR through the DV-Bridge. We then pressed the Play button on the VCR to start the video stream. Clicking Play in the Add Movie dialog box then displayed the video stream playing through the VCR on the computer screen as the DV-Bridge converted it from analog to DV in real-time.

To begin recording a portion of the video clip, we simply clicked the Record button in the software window to start the recording and the Stop button to end the recording. Once we finished with the clip, the software encoded it (Figure 3) and showed us the original length and rendering time for the clip (Figure 4).

After adding several clips to our video project, we were ready to add the finishing touches, including generating the menus and labels for the navigation screens on the DVD (Figure 5). DVD Complete then gave us the option of previewing the final product, including all menus and video clips. Because of the cost of blank DVD media and the time involved in burning a disc, it's not a bad idea to run through your video clips in this preview session to make sure they're all of adequate quality. For example, we noticed during the preview session that one of our video clips converted with poor quality, and we were able to reconvert it before burning the entire project onto the DVD and burning a coaster.

Finally, the software is ready to burn the DVD, first processing the digital data and running its tests before writing to the blank DVD-R we used (Figure 6). Depending on the speed of your computer and the

hardware you're using, this can be a slow process because preparing digital video and burning DVDs really taxes your computer's capabilities. For that reason, we'd recommend not doing any other tasks on your computer while you're burning the DVD, letting the PC focus all of its resources on burning the disc.

Keep On Burnin'

Once you've converted all of those old analog videos to DV and burned them onto DVDs, why stop there? If you have a digital camcorder, you can use many of the same techniques we described here to author DVDs with those video clips. Burning your DV camcorder clips to DVD has several advantages over leaving the clips on your hard drive, including making it easier to share the clips with family and friends and creating backup copies in a handy format in case of a hard drive failure.

Because the DV camcorder already uses digital video, you won't have the hassle of converting the video itself. Most DV camcorders can connect directly to your PC through a FireWire connection. Once the video from the DV camcorder is on your PC's hard drive, just use your favorite DVD authoring program to edit the video. Then create the DVD using your DVD burner.

The skeptic in you might be doubting how simple this process is, but as long as you have the proper equipment, burning DVDs from your personal video clips is actually as easy as it sounds. Best of all, you can make the process take as much or as little time as you want, depending on

Figure 1

Figure 2

Figure 4

Figure 6

Figure 5

Figure 3

the complexity of the DVD authoring software you choose and the type of editing results you want.

The most difficult part? It might be controlling your enthusiasm so you don't spike the VCR in celebration after burning your first DVD from videotape.

After all, you'll need the VCR to convert the other tapes. Then you can place the VCR next to the typewriter and the Intellivision gaming system in your personal Museum of the Obsolete. **CPU**

by Kyle Schurman

Ready to get started but not sure where to begin? Subscribers can consult our "Starting Down The DVD Path" checklist, which offers both loaded and cheap options for the equipment you'll need for your next DVD authoring project, at www.cpumag.com/cpuapr03/movetodvd.

Top DVD Authoring Packages

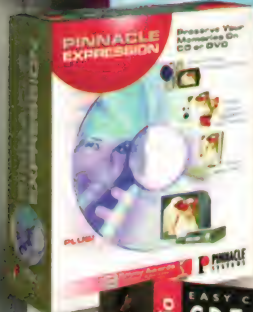
Here are some of the top DVD authoring packages that offer some cool and unique features at varying price points.



Adobe Premiere 6.5. After trying Adobe Premiere 6.5 (\$549; www.adobe.com), we're still cleaning up the drool. This professional-level product offers dozens of cool features designed to simplify the process of creating sophisticated DVDs. Premiere offers support for several types and brands of DV hardware and capture cards, and you can easily move projects between Windows and Macintosh platforms, if needed. If you already use other high-end Adobe products, such as Photoshop or After Effects, Premiere works closely with them to provide even more high-end tools. Bottom line: It's hard to argue with a product from one of the world's leading graphics software companies. Other DVD authoring options offer a lower price but few can match Premiere's high-end features.



Dazzle Hollywood DV-Bridge. Dazzle, a brand of SCM Microsystems, offers several DV and DVD authoring hardware and software products. We tried the Dazzle Hollywood DV-Bridge (\$299; www.dazzle.com), and it shipped with Dazzle MovieStar 5 and Dazzle DVD Complete as basic software options. Hollywood DV-Bridge makes it easy to transfer video clips from analog to digital format and back. It works with a FireWire connection; if you don't have a FireWire port available, Dazzle offers other video conversion hardware, such as Digital Video Creator 150 (\$199), that runs through a USB 2.0 connection.



Pinnacle Systems Expression. Expression (\$49; www.pinnaclesys.com) really simplifies the process of creating videos and exporting them. If you have a DV camcorder, you can import your raw video directly into Expression through a FireWire connection. Expression offers plenty of automatic features, which are handy for making a nice video project with few hassles. Obviously, Expression doesn't offer the high-end editing features in some of its more expensive counterparts at Pinnacle Systems. However, even if you upgrade to another package later, you'll probably find Expression is one of those software packages you'll keep available for handling quick projects because it's so easy to use.



Roxio Easy CD & DVD Creator 6. Roxio recently released a new version of its popular digital media suite, Easy CD & DVD Creator 6 (\$99; www.roxio.com). We checked out the new software, along with Roxio's VideoWave 5 Power Edition. DVD Creator gives you plenty of flexibility, letting you burn home movies on a DVD, organize electronic photo albums on a CD, create audio CDs, or back up your hard drive to a CD or DVD. Consequently, some of the pure DVD authoring features aren't as strong as you'll find in some other packages. VideoWave, on the other hand, does offer dedication to DVD authoring. You can import digital or analog video into VideoWave and then edit the video streams with some cool effects, such as a sepia filter or a picture-in-picture effect. VideoWave contains a DVD simulation feature, as well, letting you see how the video project will look before you burn it onto a DVD.



Sonic MyDVD Video Suite 4.0. Sonic is another company that offers several DVD authoring tools aimed at different price points. We tried MyDVD Video Suite 4.0 (\$99; www.sonic.com), which is a consumer-level DVD authoring tool that offers some handy features. MyDVD Video Suite works with a variety of video capture cards and features the ArcSoft Showbiz editor, which makes adding special effects easy. You can choose from several professionally designed templates to organize your DVDs more efficiently.

Check for a free option. If you've purchased a DVD burner or a new computer lately, it's possible that your hardware shipped with a basic DVD authoring package included. If so, you might want to try this free option first—especially if you're a DVD authoring beginner. Once you're more familiar with the DVD authoring process, you then can choose some features you really want and upgrade to a more sophisticated package.



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NETGEAR Home Networking



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ZDNet (November 2002)
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The DVD Dilemma

*Burning On The Right Side
Of The Law*

There are a few defining moments in the life of every true computer enthusiast. Witnessing GLQuake for the first time is one of them. Enjoying the extra real estate provided by a multimonitor configuration is another. How about your first attempt at overclocking? Perhaps you've also celebrated the writeable CD by compiling a custom '80s mix for the car, or maybe you've had a co-worker burn the latest 150MB game demo on a CD to take home. Either way, you can argue that the CD-RW has proven to be one of power users' most useful peripherals. The cost of media is minimal, CDs offer compatibility across multiple platforms, and the latest 52X

drives can fill a disc in less than three minutes. Those same drives also spin discs around 10,000rpm, though, so we can't expect the technology to continue advancing with the same alacrity.

In what direction, then, is the future of optical storage heading? Before you answer, take a look at your movie collection and think about the benefits of buying DVD movies instead of VHS tapes. Crisp picture quality, multiple languages, and 5.1-channel Dolby Digital audio are but a few of the features we associate with the popular optical media made possible, in part, by advancements in storage technology. Briefly, data stored on a DVD is divided into tracks. These tracks are defined by small pits that correspond to 0s and 1s—the digital information. Because these pits are much smaller than pits on a CD, the infrared

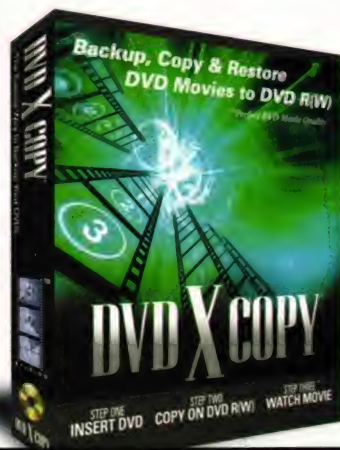
laser is replaced by a red laser with a shorter wavelength. The result is a disc with the same dimensions as a CD and a capacity of up to 15.9GB.

The equipment necessary to burn a DVD has actually been available for about six years.

When it debuted, the first DVD-R burner was prohibitively expensive to the tune of more than \$16,000. As time has passed, though, the technology has matured, and prices have fallen accordingly. These falling prices have helped make DVD ripping and burning more mainstream, bringing questions of legality to light, especially in regard to the copying of DVD movies.

Legality Issues

As with most forms of media, there are perfectly legal uses for writeable DVDs and there are other, less honorable applications. It may be considered kosher to duplicate a piece of software you own for safe keeping, but woe is he caught by Microsoft in a dank warehouse with an industrial-strength duplicator making "personal backups" of Windows XP. Therein lies an important distinction between DVD movies and other forms of media. If you've recently purchased a book, CD, or piece of software, you are entitled to make a backup copy according to an exception called fair use that prevents a conflict between the First Amendment's guarantee of free



DVD X Copy doesn't break DeCSS code and has many safeguards against piracy, but the company behind the software, 321 Studios, is still involved in lawsuits with seven movie studios that feel the software violates the DMCA.

speech and the protections afforded by copyright law. In the event that the original is lost or destroyed, the backup may be used in its place. You've merely sheltered your investment.

The DMCA (Digital Millennium Copyright Act) prohibits backing up a DVD movie encrypted by the CSS (Content Scramble System), even if you're the only one who will ever see it. Section 1201(a)(2)(A) of the DMCA imposes further restriction: It doesn't allow technology manufactured for the purpose of defeating the CSS scheme. In short, DeCSS (software that breaks the CSS code) is illegal here in the United States, as is all other software written to "circumvent a technological measure that controls access to a work protected under (the DMCA)."

Eugene Volokh, a professor in UCLA's School of Law, points out that even while the DMCA does in some measure interfere with traditional rights of fair use, it does so in a manner intended to deter unlawful duplication of copyrighted material on a grand scale. He goes on to observe that before the advent of mass copying, it wasn't explicitly illegal to decrypt data for the purpose of fair use. In fact, reverse-engineering software by decompiling it is often regarded as an expression of fair use, as long as it doesn't facilitate a copyright violation. As it pertains to the controversy at hand, though, the MPAA (Motion Picture Association of America) seems to contend that any software that aims to protect fair use by working around CSS encryption is in direct violation of the DMCA. Given the situation, it seems nearly impossible to protect the right to fair use and copyright law simultaneously.

So What Can You Do?

What, then, falls under the classification of an unequivocally legal use for a

DVD writer and duplication software? There is little doubt that a DVD, as a means of storage, is more efficient than a CD. Its capacity of 4.7GB (on a single-sided, single-layer disc) simply dwarfs the largest CD-R, which holds roughly 700MB of data burned using Mode 1. The writable DVD goes beyond being a mere tool for backing up a hard drive. Aided by set-top compatibility, it also bridges the gap between the PC and home entertainment center. An avid vacationer, armed with a DVD burner, could chronicle his summer adventures and author a DVD in time for Christmas. Or, a newlywed couple could create a short movie consisting of the ceremony and reception, sending it to guests as a thank-you gift. The possibilities are endless.

However, once you move beyond backing up an unencrypted amateur compilation, legal issues arise, at least in the United States. Those living abroad may encounter less resistance, as some countries haven't yet outlawed the tools needed to back up an encrypted DVD. Fear not, though, for those in the United States can *already* purchase software that creates a backup copy of a DVD. There are plenty of instances when a copied DVD would be an ideal alternative to the original. Let's say, for instance, that you recently purchased the first season of "The Sopranos" for \$75. The boxed set includes four discs and is composed of production notes, audio commentary, a 77-minute interview, and a pair of featurettes, in addition to the actual episodes. But to take the whole caboodle with you on vacation would be cumbersome. More importantly, the discs could get scratched or even lost. The solution? Make a copy and take that with you instead.

DVD X Copy. Yet, even commercially available software is wrapped up in legalities. 321 Studios, a St. Louis, Mo.-based

company, is involved in a lawsuit with seven major movie studios that claim 321's flagship title, DVD X Copy, violates the Digital Millennium Copyright Act. The DMCA was drafted to protect the authors of digital media, effectively broadening the scope of existing copyright laws, but has recently come under fire for ambiguity with regards to "fair use" in the digital age. According to section 1201(A)(1) of the DMCA, "No person shall circumvent a technological measure that effectively controls access to a work protected under this title." Case in point: DeCSS is illegal because it breaks the CSS, one such "technological measure" designed as a means to encrypt DVD movies.

DVD X Copy lets a user back up a DVD movie onto a blank DVD, so it isn't hard to surmise why the MPAA would take issue with it, as well. However, in a recent interview with 321's Elizabeth Sedlock, we were assured that DVD X Copy does not decrypt the CSS code. Moreover, 321 Studios has implemented a few measures of its own to discourage piracy. Not only does the software add a disclaimer at the beginning of a backed-up movie and refuse to duplicate the copy, but it also embeds a watermark capable of linking a pirated



The Sony DRU-500A is a good choice for your DVD backup projects. It supports both DVD-R and DVD+R media, making it a safe bet until the industry chooses one format.

movie to the software's registered owner. And on February 11, 321 Studios announced it would award \$10,000 to anyone who could give information that would lead to the conviction of someone using the company's software for pirating movies. (See our review of DVD X

Copy on page 73 of the March 2003 *CPU* and DVD Copy Plus on page 70 of the August 2002 *CPU*.)

Perhaps the MPAA is more disturbed by how easy it is to copy a DVD using DVD X Copy. The procedure is literally as simple as inserting a single- or double-layered DVD movie, clicking the Copy Now button, and following the program's prompts to insert blank media then remove the finished product—an exact copy of the original. Unfortunately, double-layered (9.4GB) originals have to be spread across two writeable discs because blank media is currently limited to 4.7GB. DVD X Copy is unique, though, in that it lets the user define the break point and move (or eliminate altogether) special features.

The jury is still out on a literal interpretation of the DMCA. By law, 321 Studios is prohibited from manufacturing any product that is designed to "circumvent protection afforded by a technological measure." But if DVD X Copy does its work *after* the CSS code has been legally decrypted by a decoding engine, the software may be perfectly viable. The only real certainty here is that DVD X Copy is currently available from www.321studios.com and will likely remain so until a final verdict is rendered in the lawsuit.

InstantCopy. 321 Studios is making quite a statement with DVD X Copy. Even if the application doesn't perform any decryption, the MPAA would still love to see DVD X Copy yanked from retail shelves along with DVD Copy Plus, which copies a DVD movie to VCD or DivX. It would seem that the ability to copy encrypted movies to either DVD or CD is simply hitting too close to home for the major movie studios.

Pinnacle Systems has taken a different approach with its brand new InstantCopy software—an approach that looks to be less controversial. The

most notable deviation between DVD X Copy and InstantCopy is that Pinnacle's application does not permit the duplication of a CSS-encrypted disc. Under normal circumstances, this would be a debilitating disadvantage because most movies are protected with CSS. However, the software will read VOB or IMG files from a hard drive. In other words, it will work with data previously decrypted, though Pinnacle does not condone use of its software with any illegal decrypting application.

According to Brian Lane, the senior product manager for Pinnacle's latest duplication title, InstantCopy is able to process a movie's video stream and intelligently apply compression to fit an entire DVD-9 to a DVD-5. Moreover, it enables removable audio streams and region coding using a proprietary engine obtained from VOB Computersysteme. The software goes even further, providing tools for backing up software

and audio, as well. Finally, InstantCopy is available for \$49, compared to DVD X Copy's asking price of \$99.

Stay Tuned: This Is Far From Over

Even though the legal landscape surrounding DVD backup may be in a

state of flux, there is still no question that DVD burning hardware is becoming more popular. And, even as we saw the recording industry fight music piracy tooth and nail, the MPAA's negative reaction to "backed up" digital media is predictable—dare I say, understandable. There are many uses for a personal copy of a legally purchased movie, and there are countries where it is perfectly legal to make such a copy, even if it means breaking the CSS scheme. If you're in the United States, we'd urge you to try either 321 Studios' DVD X Copy or Pinnacle's InstantCopy, legal alternatives to more illicit methods. **CPU**

by Chris Angelini



Pinnacle Systems' answer to DVD X Copy is InstantCopy, software that may prove less controversial because it doesn't allow the duplication of a CSS-encrypted disc.

The Controversial Code

In 1999, 15 year-old Jon Johansen helped reverse-engineer the Xing DVD player along with a German programmer, exposing the CSS algorithm. Jon's motivation was to add DVD support to Linux, which lacked an open-source DVD player. Once it was determined that software that breaks the CSS code (DeCSS) was in violation of the DMCA, Jon's code was banned in the United States in August of 2000. The code remains illegal, but since then, many applications have been written to make the decryption process a one-click endeavor, and they are easy to find for free or for a small fee on the Web. However, this software remains illegal in the United States.



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PlexWriter 40/12/40A



PlexWriter 40/12/40A



PlexWriter 40/12/40A



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The Bleeding Edge Of Software

Inside The World Of Betas

by Warren Ernst

GRAPHICS & DESIGN BY SONJA WARNER,
JASON CODR & DAVID FIALA

Safari 1.0 Beta 60

registered on most browser radars. Thus, some pages render from slightly askew to completely blank, either due to irregular HTML or Safari/KDE rendering problems. As the rendering engine's popularity grows and evolves, fewer incompatibilities appear.

Given a G3/G4's processing power, Internet Explorer has always seemed inexplicably slow. Microsoft has suggested this is a fundamental issue with Mac architecture, but Safari may prove this wrong. Apple claims Safari starts 40% quicker, loads pages 300% faster, and runs JavaScript twice as fast as IE; unscientific testing bears this out, especially on slower Macs. Safari is also much faster than Netscape/Mozilla and still slightly faster than Chimera and Opera.

Some speed comes from Safari's size. The entire download is 2.4MB. The installation routine installs a single executable to the desktop. There's no email, chat, HTML composer, address book modules, sidebar, or automatic form filler-outer. A Google search

the current site displays a SnapBack icon in the address field. Click all the links you want, but clicking the SnapBack icon takes you to that first page. After awhile, you'll wonder why no one thought of this before, and you'll almost forget about tabs completely. Other smaller features also reflect this alternative thinking.

Bookmark management works with the entire browser window, making folder organization and navigation a breeze. Adding a new bookmark automatically prompts you for folder placement information, so everything is always organized. Unfortunately, the Bookmark menu and Bookmark shortcut bar aren't synchronized with other Bookmark items, so you may have to update bookmarks in two locations during housekeeping.

Beta 60 fixes many previous annoyances, but some remain. Safari still ignores the system-wide font-smoothing settings, but it

now remembers your font-size settings from page to page and site to site. You can now add the Home and font-size buttons to the toolbar. Flash animations now run correctly and at good speeds. There's better

XML support, greater overall stability, and support for self-signed security certificates. New browser windows don't get randomly positioned, either.

Safari represents a lot of fresh thinking, but you'd expect that from a company asking users to "Think Differently." Too bad there's no Windows version. ▲

Send Us Your Betas

Know of software in the beta stage that's deserving of some attention? Let us know. We'll take a look at it and possibly give it a go-round. Send your prospects to bleedingedge@cpumag.com.

field is in the main toolbar, but there's no integration to other Web sites or advertisers. There are also no tabs, which has many power users Apple is targeting up in arms; Apple warns not to expect them either.

Safari does a tabs alternative via SnapBack Technology. When you type a URL, jump to a bookmarked site, or just command it,

Just when you thought the browser wars were over, Apple fires one over the port bow with its latest beta release of Safari, its new OS X-only Web browser.

Light, nimble, and fast characterize the browser's goals, and the developers have succeeded admirably. Safari also incorporates a fresh approach to bookmarks and navigation but bucks the current trend of adding tabs to "alternative" browsers.

Safari is an open-source browser, built from the open-source code for KHTML from the KDE project. Apple's changes to this code are folded back into KDE, but Safari's source code (the Safari Developers Kit) isn't available. Prior to Safari, the KHTML rendering engine never even

Official product name: Safari

Version # previewed: 1.0 Beta 60

Publisher: Apple Computer

Developer and URL: Apple Computer;
www.apple.com

ETA: Q2 2003

Why you should care: The latest high-quality weapon in the browser wars.

ClipTray 1.60 beta 4

I love the Windows Clipboard. I use it all the time. I use it all the time. (See?) Having established my allegiance, let me go on the record and say that sometimes the Clipboard is pretty brain-dead. Your computer probably has more RAM and hard drive space than every computer on the planet had combined in 1955, but Clipboard doesn't keep an intuitive record of what was in there or the format. And essentially, all you can do is paste from it.

ClipTray looks to solve this problem, but in a slightly different way than your classic "multiple-clipboard manager," such as Yankee Clipper III. Think of ClipTray as a Clipboard history and launcher.

Some multiple-clipboard managers aren't compatible with some programs that would really benefit most. ClipTray still works in these situations because, as far as Windows is concerned, there is still only one Clipboard. ClipTray keeps a log of

what's been pasted in the Clipboard that's accessible via a Taskbar tray icon. Clicking it displays the Clipboard History and lets you move something from the History into the active Clipboard again. Then you can paste it as usual.

You can act on certain types of Clipboard clippings in different ways. For example, ClipTray keeps track of URLs differently than regular text, and you can open a browser window and jump to the copied URL with just a click or two. Text clippings can have the capitalization altered (ALL CAPS, First Caps, all lowercase, and others), and you can delete or rename files before pasting.

A program such as ClipTray probably isn't worth a whole lot of money, but then again, this is freeware. Beta 4 was entirely stable and complete with a good Help file and is well worth a download. ▲



Official product name: ClipTray
Version # previewed: 1.60 beta 4
Publisher: ClipTray Software
Developer and URL: ClipTray Software;
cliptray.levillage.org
ETA: Q2 2003
Why you should care: The Clipboard doesn't have to be brain-dead on your system.

NSIS 2.0 beta 1

OK, so you've gone months on a shoe-string budget writing the latest killer app. Now that the creditors are knocking on the door, you're ready to ship version 1.0 and make your fortune. But what about your installer?

The de facto standard is InstallShield, but its licensing and pricing can be significant. There are less expensive installers out there that are easy to work with (FileStream's InstallConstruct comes to mind), but your digital work of art needs extra special installation features that aren't typically available on the low end. Because you're no stranger to scripting (you are a programmer, right?), the perfect solution may be NSIS (the Nullsoft Scriptable Installation System). The program is robust enough to have installed Winamp about a zillion times, has all the power of InstallShield, can automatically make uninstallers, has the support of a devoted company (Nullsoft) and hundreds of developers in their own forum, and it is free and open-sourced.

In the words of its own Web site and documentation, NSIS is truly "an installer that doesn't suck."

Two things may have kept NSIS from taking over the market, including the fact that NSIS installers have always looked like the Winamp installer, and "there are no Wizards to get in your way," which is another way of saying you needed to be an expert and know your way around large configuration files to do anything. Version 2.0 certainly takes care of business in the appearances department, with a completely modern look and allowing for Readme's, splash screens, and graphics. There are also features to verify file names and folder names in case you missed something. Despite this, installers are extremely compact.

You still need to figure out NSIS' scripting language to do anything meaningful with this release, however. Depending on your savvy, this may be a plus or a minus. If you have absolutely no funds for powerful and flexible installers, however, NSIS is just the ticket. ▲



Official product name: NSIS
Version # previewed: 2.0 beta 1
Publisher: Nullsoft
Developer and URL: Nullsoft;
www.nullsoft.com
ETA: Q2 2003
Why you should care: There's always room for a high-end, free installation product.



WinPatrol Plus 4.0

\$12.95

BillP Studios

www.winpatrol.com



BillP Studios WinPatrol Plus 4.0

Keeping track of what goes on behind the scenes in Windows can be difficult, even for experts. One spyware app can slow you and your system down, making life frustrating.

WinPatrol Plus 4.0 aims to help you better understand the programs running on your PC and alert you to new software that's added without your permission. It easily identifies and removes adware and spyware and is equally effective at removing software that's less nefarious but taps system resources. The program runs on Win9x/Me/2000/NT/XP.

A free version shows data about startup programs and current active tasks, providing more details than Task Manager. You can remove or temporarily disable startup apps with a click. You can also swiftly kill any running app. WinPatrol can also optionally warn you if new startup apps are added, when software or a Web site tries to change your home page, and when a Web site uses cookies. The app's cookie management is a bit weak, but it can help refuse cookies with specific text in the name.

The \$12.95 Plus version adds Web-based info pages that explain what the apps that WinPatrol finds actually do. Data was available for many, but not all, of the programs on my test system. Windows and other Microsoft apps were well documented (explaining a file's purpose, how to remove it, and whether it's safe to do so), but there was no information about some third-party programs, such as those that peripherals add.

Both versions are svelte; the entire installation is about 200KB. Rather than being loaded with an unwieldy database of viruses and spyware, the app focuses on system monitoring and uses the Web to fetch details. Unlike Ad-aware and some other spyware removal tools, WinPatrol is fairly fast at scanning your hard drive and Registry; it focuses on what's running now and what will be running the next time your PC boots. The interface could be more polished, but the app's ability to quickly identify questionable programs and remove unwanted software is welcome. ▲

by Kevin Savetz



WinDVD Recorder

\$119.95

interVideo

www.intervideo.com



interVideo WinDVD Recorder

If you're lusting to add a DVD recorder to your home theater system but are balking at the \$1,000-plus price tag, WinDVD Recorder wants to answer your prayers. The software plays and, when coupled with a video-input source, records DVDs. At about \$120 (plus a DVD burner and video capture card), it's significantly less expensive than a consumer electronics DVD writer. But it may leave you wishing for more.

The program lets you create DVDs from any video source, such as a DV camcorder or live television, and you can save directly to a DVD or hard drive for later burning. The program is best suited for converting home movies to DVDs, but it doesn't include even the most basic facilities for editing clips or DVD authoring. Although it can record TV shows for later viewing, WinDVD Recorder isn't well suited as a PVR replacement. I couldn't find a way to schedule a recording for later or watch a DVD while recording a TV show in the background.

The program has good support for DVD playback, including subtitles, languages, pan and zoom, several aspect ratios, and other features common to DVDs. The interface, however, uses a hackneyed "make it look like a consumer electronics DVD player" metaphor. The result is a steep learning curve while you struggle to figure out what each tiny, unlabeled button and icon does.

The program also has some stiff system requirements, including Win2000 or XP with at least a 600MHz PIII (a 1GHz PIII for direct-to-disk recording, but a 1.6GHz P4 preferred). If your PC is on the border, try the free trial version first. You'll also need a PCI or USB video-input device or compatible DV camcorder and a compatible DVD+R/RW, DVD-R/RW, or DVD-RAM burner. Ultimately, consider saving your \$120 and keep putting your pennies toward a hardware DVD burner. ▲

by Kevin Savetz

ViaVoice 10 Pro USB Will Listen, Sort Of

“Of the three major outbreaks systems the future Mac cost X is probably trout of the greatest mystery.” That’s what ViaVoice 10 Pro, the new version of IBM’s dictation software, heard as I read to it from a recent *CPU* article. (The article actually reads “the future of Mac OS X is probably shrouded with the greatest mystery.”)

ViaVoice 10 is designed to let you speak in order to control your computer and dictate word processor documents, email messages, and other text. There are two main features of the program: operating the computer by speaking commands and dictating documents.

Speech recognition is an incredibly complex process, and no one expects it to work perfectly, but ViaVoice often proves too frustrating to use at all (although its output is often amusing).

You’ll need an audio input device to use the app; the program bundles with a comfortable Plantronics USB headset that provides a microphone with stereo sound. The program also supports other input types, such as audio files imported from some handheld digital recorder models.

Before you can use ViaVoice, you need to train it to understand your voice’s particular inflections by reading stories aloud. The more you train the software, the better it should be able to work. However, it takes 15 minutes to a half an hour to read each training story. After I trained ViaVoice with two stories, the software was able to understand such commands as “Start program Microsoft Word” and “Change the third paragraph to font Arial,” but the quality of open-ended dictation was poor.

Dictation quality increased slightly after further training—be prepared to spend a couple of hours to fully train the software—but wasn’t enough to make ViaVoice an entirely productive tool. You can dictate into SpeakPad, ViaVoice’s word processor that’s optimized for dictation, or into any other application, including Microsoft Word and Excel. But you can’t just read from a page. You’ll find yourself keeping a constant eye on the program’s output, uttering “scratch that” and “correct” dozens of times even to dictate a few paragraphs. Background noise, such as a home’s central heating

or other voices in the room, often further confuse ViaVoice.

Besides voice training, the program can learn the sounds of words that you use that aren’t in its vocabulary. So over time, the program should learn that “Mac OS X” isn’t “Mac cost X.” You can also purchase additional vocabulary sets for legal and medical use. To help you along the way is Woodrow, an obnoxious animated pencil that makes Microsoft Office’s Clippy seem virtuous in comparison. (Luckily, you can disable Woodrow.)

The Natural Language Commands—commands to control the computer itself—work well because ViaVoice only has to work from a relatively small set of preset commands, compared with the vast and unpredictable language that could occur in dictation. I could launch Internet Explorer and surf the Web reasonably well by saying the names of hyperlinks and a handful of other commands, such as “back” and “home.” I could also use voice commands, such as “Schedule a one hour meeting with Fred on Monday,” to add an appointment to Outlook. There are quite a lot of built-in Natural Language Commands, but they’re not expandable, so you can’t use your voice to control an application if support isn’t built in.

The program is compatible with Win98SE/Me/2000/XP. If you’d like to experiment with voice recognition but don’t want to spend \$190, there are less expensive versions to choose from, including a \$30 personal edition.

With enough training time and patience, ViaVoice could be a useful input alternative for those unable to use the keyboard or mouse. If you’re hoping for a faster alternative to typing in order to get information into the computer, ViaVoice will prove to be a frustrating experience. Is ViaVoice right for you? The answer is a trout of the greatest mystery. ▲



ViaVoice’s commands are available anytime via a toolbar or by speaking.

Woodrow wore out his welcome even faster than Clippy did.



ViaVoice 10 Pro USB

IBM

www-3.ibm.com/software/speech

\$189.95 (\$89.99 upgrade)



by Kevin Savetz

An iLife Is Born

Apple Delivers A Bouncing Bundle Of Multimedia

Once upon a time, there was a village where people ate iMeat and iBread. They ate them separately, but they were satisfied; the iMeat was good protein, and the iBread was wholesome.

Then along came a traveling salesman—let's call him Steve—who swept into the village and snatched up a plate of meat and bread. From one pocket he produced lettuce; from the other, cheese. With a blinding whirl of his hands, he slapped them all together and said, "No longer shall you eat iMeat and iBread! Now, you shall consume—iSandwich!"

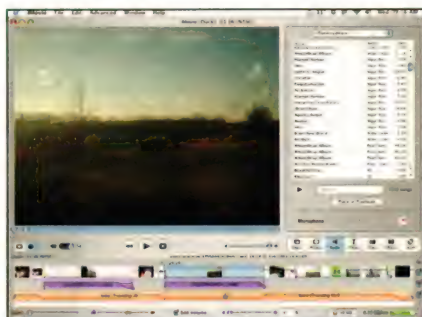
Will Mac users be happy with their new entrée, or will bugs spoil their picnic? I pondered that question while checking out iLife, Apple's new multimedia application suite. iLife brings together four apps Apple has had around awhile, updates three of them, and promises a new level of multimedia nourishment. I put it to the test by building a DVD with four movies and five slideshows. I was impressed, but also annoyed by several notable bugs.

iMovie 3

The heart of iLife is iMovie 3, which is a major upgrade to Apple's free video-editing software.

Apple pretty much created the consumer video-editing category with the original iMovie back in 2000. Version 2 was a solid, basic video-editing program. With version 3, Apple pours on the special effects and ties iMovie in with the other iLife applications. (You can now drag and drop iPhotos and iTunes files from a special pane directly into your iMovie.)

iMovie's most striking new feature is the Ken Burns Effect; it lets you pan and zoom across still images to make them more dynamic. It's unique and powerful and lets you turn a bucket of photographs into a convincing movie. I took a half-dozen shots



iMovie

of New Year's fireworks in Iceland and combined them with the Burns Effect and the Flash and Fog effects; after a half-hour's work, I was transported back to Reykjavik. Between the Ken Burns Effect and the iPhoto integration, iMovie now has a new life as a super-slideshow creator.

The Ken Burns trick is the best of a slew of new visual effects, transitions, titling styles, and sound effects Apple dumped into iMovie. Many are pretty corny ("Fairy Dust?"). More impressively, iMovie now lets you edit audio levels, bit by bit, throughout an audio clip. It still doesn't show the waveform, but you can finally mute a track for just a little while.

Alas, my affair with iMovie 3 isn't entirely a romantic comedy. I found a few bugs, the most notable being there's no obvious way to turn off the Ken Burns Effect if you just want to drop a still image into your masterwork (although you can cancel the rendering, leaving the still image). Images rotated in iPhoto showed up in iMovie with their original orientation, and I was strangely unable to edit the new sound effects (to make them shorter, for instance).

I also found iMovie 3 to be considerably slower than iMovie 2. Previews of effects sometimes played back unrealistically slowly, and sound hiccupped in movie previews.

The speed problem is even worse with imported iMovie 2 projects, according to dozens of posts on Apple's support board. (Exported movies looked perfect, though.)

The speed issue reveals one true challenge: Apple can produce all the brilliant video-editing software it wants, but Motorola is still slowly throttling Apple to death. Video editing is one area where processor speed *does* matter, and Intel and AMD are slinging around 3GHz processors like poker chips while Apple begs desperately for whatever lower-speed chips Motorola will deign to deliver.

iTunes 3

There's nothing new about this version of Apple's music-playing software, introduced in July 2002. (iTunes is included in iLife so you can drop MP3s into photo slideshows, movies, and DVD projects.) It's still a slick, easy way to manage your collection of MP3s, WAVs, and AIFF files. It's also a free download, so it's something of a no-brainer.

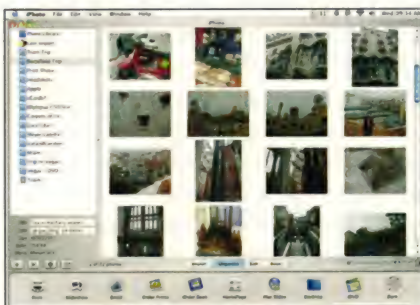
Version 3 adds Smart Playlists, which dynamically change based on criteria, such as how recently a song's been played or how high you rate it on a scale from 1 to 5. But now that it's going on a year old, iTunes 3 is looking a little long in the tooth. I understand why it doesn't support WMA files (Microsoft bad!), but considering how Apple has embraced the MPEG-4/AAC format with QuickTime 6, it's striking that iTunes can't play or rip MPEG-4 music files.

iPhoto 2

The iPhoto 2 upgrade doesn't reinvent Apple's groundbreaking photo-organizing software, but that's not altogether bad. By and large, Apple has left a good thing alone.

iPhoto 2 now features a few simple editing tools; it's no Photoshop, but the Enhance button mimics Photoshop's

Auto Levels feature and does a good job of fixing white balance on photos taken on cloudy days. The new Retouch Brush, like Photoshop's Healing Brush, lets you scrub blemishes out of images. And, of course, the new iPhoto is linked into iMovie and iDVD.



iPhoto

You can also export slideshows as QuickTime movies, albeit without transitions. (To make fancier slideshows, you have to drag photos one-by-one into iMovie.) In general, iPhoto's slideshow function is anemic. You can only put one song behind a slideshow, and there's no way to superimpose captions.

And why don't iPhoto and iTunes support Rendezvous, Apple's new networking protocol? In 2002, Steve Jobs demoed a Rendezvous-aware version of iTunes that let those on a LAN share their music libraries by streaming the music. He also promised a Rendezvous-aware version of iPhoto that let users browse each other's photo libraries. *That* would be revolutionary.

iDVD 3

iDVD is where iLife comes together—and where minor importing glitches are the most annoying.

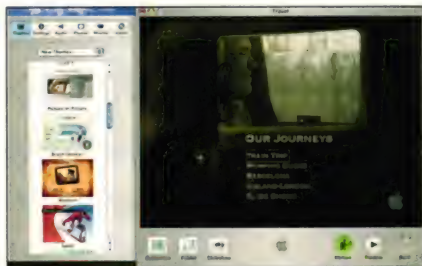
Apple's simple drag-and-drop DVD creator has been pumped up with a slew of new themes and better integration with the other iLife apps. iDVD is still slick, the themes are still highly and easily customizable, and now you can put as many as six chapter marks in your iMovies—an eagerly awaited feature.

Theoretically, you're supposed to be able to drag and drop iPhoto albums and iMovies into iDVD, but I had trouble.

iDVD scrambled my albums and threw my movies' audio out of sync. The solution was using the export-to-iDVD buttons in the source applications. They worked fine.

Every export from iMovie to iDVD creates a new iDVD project, which is a pain if you're trying to put five or six short movies on one DVD. (You have to copy and paste the movies from your old project into the new one.) And after opening iDVD 2 projects in iDVD3, I found my buttons had been moved around.

The program's greatest flaw appears to have been put in out of spite; it doesn't support any external DVD burners. Maybe that will drive sales of DVD-R-equipped Macs, but it's a petty way to cripple your software.



iDVD

The Verdict

Fun, cool, somewhat buggy, and not as revolutionary as previous versions, by a long shot. The big advantage to iLife isn't new features; it's integration, which brings a lot of new verve to iMovie and mostly leaves iPhoto and iTunes alone.

For Mac owners with SuperDrives, iDVD is still worth the \$49 Apple is charging because you get a ton of new themes. For Mac-heads who don't record DVDs, the other three programs are certainly worth the time they take to download. ▲

by Sascha Segan

iLife

\$49

Apple

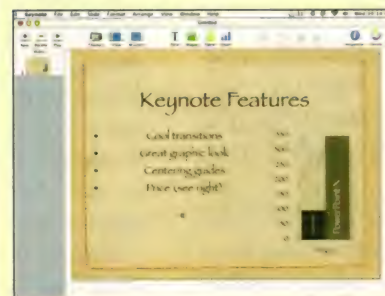
www.apple.com



Don't Call It iPoint!

Usually, going up against Microsoft Office is like conducting a land war in Asia—you have to have the ruthlessness of a Mongol horde or you'll end up starving outside Stalingrad. So what's Apple doing developing presentation software?

Steve Jobs' (dis)ingenuous answer: Keynote was developed for his huge presentations for Macworld conferences. Peel back a layer, and you get an Apple spokesman telling *CPU* that Keynote is a showcase for graphics technologies developers haven't been making enough use of. Peel back another layer to reveal rumors of how Apple is trying to make sure it can live without Microsoft, just in case.



Keynote

\$99 | Apple | www.apple.com



Keynote's killer feature may be its \$99 price, one-third of what Microsoft charges for MonopolyPoint. Feature-wise, Keynote is especially strong on graphic design, with great transitions and animations. It can also import multilayered Photoshop files and semitransparent images, and its very handy rulers tell you when your items are properly centered. The major element I missed from PowerPoint was the slide sorter. Decide for yourself whether a slide sorter is worth \$200.

Keynote claims to read and write PowerPoint files; it opened every PowerPoint X presentation I had, but it sometimes colored text and scaled graphics incorrectly or left extra bullet points dangling in various places. But that's not much of a sour note in what is a pretty delightful tune.

Your Writing Is On The Wall

Face it: Fonts are fantastic! If you're stuck with Helvetica, you really should get with the Times. Create your own characters and feed them to friends for their continued enjoyment. It's easier than you think, although the barrier to entry is a little pricey. Years ago, I paid someone a few bucks to spin my manuscript directly into a TrueType font. The results were amazing, although I was on my own when it came to adding extended characters and random glyphs into the resource. That's when I stumbled upon ScanFont from FontLab.com.

For \$200, you get a full-featured program that's intuitive enough for intermediate users (watching the video tutorials gives you a much-recommended knowledge boost). With ScanFont, you can import 2-bit BMPs with ease. Think of all the doodles you've lost to the ravages of time; convert them before they disintegrate into a faint memory! You can download the demo before shelling out any cash, but you won't be able to export your creations into a usable format.

It takes no time at all to take a ready-to-go set of scribbles and save them into a single TTF. I offered to convert simple logos and signatures for people at a reasonable price. Within days, I had more than paid for the registration. That's how anybody should look at software: "Yeah, it's not free, but how can I make it cost neutral?" If an angle does not exist, make one. Do it for yourself, and then do it for someone else. Cross-platform compatibility may become an issue, but that's when you'll want to turn to ScanFont's older sister, FontLab. It's twice as expensive but 14 times as powerful—definitely not for the novice. Guess what? It supports OpenType, the latest standard to smack the scene.

Adobe and Microsoft developed OpenType; OSes like OS X and Windows XP can't get enough of 'em. If you have ClearType enabled (sub-pixel font rendering for LCD screens), OpenType creations will look infinitely better than their TrueType counterparts. Pick up FontLab for no other reason than to convert your current collection, provided you have rights. That's something you may not understand or remember: Fonts aren't always free. Some foundries

survive solely on registrations. Pass 'em a few bucks if you appreciate their work and want to see 'em do more. Find fully legal faces on FontFace.com—but the fun doesn't have to stop there.

By now, you should have visited my blog (chris.pirillo.com) at least once. If you haven't seen the "yellow legal pad" design, it's time for a revisit. I've embedded my handwriting font for all Internet Explorer users. My words in my manuscript: What could be sweeter? A new version of Microsoft WEFT (Web Embedding Fonts Tool). There's virtually no other way to get the job done, and it's a very user-unfriendly utility. Knowing that the world is starting to slide away from IE, I've also placed a ZIP file containing my handwritten TrueType/OpenType digitization under the pi symbol.

To now, I've only told you about one company's software. That's because everything else out there inhales with great force. Data Becker's Your Handwriting 2.0 consistently creates mediocre TTFs, but what do you expect for \$20? Give it a go if you're a cheap-skate, but don't expect to be impressed when all is said and done. There's also the all-but-abandoned Macromedia Fontographer, with its sadly outdated UI and less-than-stellar toolset; don't expect any more updates for this product line. High-Logic's Font Creator

Program suffers from a slightly clumsy interface. It works better than these other FontLab alternatives at \$50, but I still found it less intuitive than ScanFont.

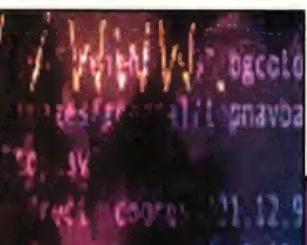
Now that you know where to look, make up your own mind. A personalized font makes a great gift that no one would ever expect. I successfully assembled several complete alphanumeric sets from old greeting cards and nontyped correspondence. To date, I've yet to see a disappointed face. At first, friends freak out when they see their scrawl sitting on the screen. Minutes later, they're ready to write with renewed vigor. My name is Chris, and I'm a fontaholic. Please, send me your personally crafted digital-hand handiwork. ■

You can dialogue with Chris at chris@cpumag.com.



Chris owns
LOCKERGNOME.COM,
PIRILLO.COM,
GNOMEDEX.COM,
RENTMYCHEST.COM,
and
GNOMETOMES.COM.

In his spare time, Chris wonders what it would be like to have spare time. His home is now a quiet one, as the dog recently ate Chris' vintage collection of MP3s. When not pretending to be himself, you can find Chris counting spilled toothpicks in small-town cafes. He single handedly caused the beanie-weenie crisis of 1987. The state of Iowa finally asked him to leave in 2001 because his mere presence was starting to spook the hogs. You will know it is time to turn the page when you hear R2-D2 beep like this: *Eeka Weeka Blinky Bloopy Bleep Bloomp Bwaa*



Open Upgrade Options



Pete Loshin, former technical editor of software reviews for Byte Magazine (print version), consults and writes about computing and the Internet. He also runs www.linuxcookbook.com. He owns shares of both Microsoft and Red Hat and believes that Windows isn't for everyone, but neither is Linux.

Upgrades are the lifeblood of the commercial software industry, yet they figure prominently in the free-software world, too. Open-source programmers keep trying to make their stuff better, faster, and shinier, and new releases can cure "Windows envy" for those who fear using the same exact software for more than 18 months.

As I write (in February), the GNOME desktop environment version 2.2 was just released, eight days after the K Desktop Environment (KDE) 3.1 became available. To use Linux on your desktop, you'll likely use KDE or GNOME to manage your windows; check the latest versions for new goodies.

The cool thing about upgrading *NIX/free software is that it's usually pretty easy to revert to how you used to do things. First, most free software projects archive earlier versions, so if you need to rebuild a Red Hat Linux 6.2 server, you can. Second, you needn't remove the old code before installing the new, which means you can test the two versions side by side before deciding to accept an upgrade. But if you've been reading this column, you knew all that. This month I have a sack full of tools/services to stay on top of major and minor software upgrades.

If you run Linux, you probably use Red Hat or another distro that depends on industry standard RPM (Red Hat Package Manager) packages for, well, packaging software. Mandrake and others use it. Most of these distros include a command-line version of the RPM installer, so you just need to download the latest RPM and run the command: `rpm -ivh package-name.version.rpm`.

The problem with update management software is it doesn't handle dependencies well (the Debian standard .deb packages are arguably better designed for trouble-free installs). If a package requires software not installed or a different version than is installed, most RPM software returns an error message.

Red Carpet from Ximian—the folks that bring you Evolution (a full-service mail/groupware client) and Ximian GNOME—makes updates much easier. Red Carpet checks dependencies and upgrades or installs software you need automatically. If Red Carpet can't finish the install, no harm is done, and the system stays as is.

Red Carpet channels are sponsored by software vendors and projects, and you can subscribe to the channel(s) you need. Different channels carry the latest versions of various Linux distros, as well as channels for Evolution, GNOME, Red Carpet itself, and others.

If Ximian's Red Carpet channels don't load fast enough, you can pay for Red Carpet Express and priority access to the servers. It's less than \$100/year, or \$10/month; it's a great value and great way to support an open-source company.

Automatic-system software updates aren't just for commercial OS users anymore. Red Hat offers the Red Hat Network ([rh.n.redhat.com](http://rhn.redhat.com)) for premium access to new downloads and automated-system patching for all the latest fixes with a single click and more. The Basic subscription is \$60/year, with a 60-day free Demo service. The ultra-premium Enterprise service is \$96/year (all prices per system).

Not a Red Hat fan? One Slashdotter recently called it "mini-Microsoft." Check your favorite distro's Web site. MandrakeSoft offers Mandrake Online (www.mandrakeonline.com), as does Lindows with Click-N-Run membership (www.lindows.com).

These services are often missing the software you need or want at any given time, so it never hurts to know how to install a package from an RPM file or even from sources. It's really not that complicated.

Speaking of upgrades, the other day my video card went kablooeey. I got a replacement from my friendly neighborhood Computer Café. My request for a Linux-friendly card was met with some puzzlement. They didn't know if the cards they stocked would work but were sure no drivers were included. "Don't worry," I assured them, "Linux has always been pretty good about auto-detecting things and automagically making it all work." Twenty minutes later, I was up and running in glorious color and no drivers to install, either.

Linux wannabees, tell me what application is holding you back from moving to Linux. Linux users, tell me the oddest app you use on Linux. ■

Get saucy with Pete at opensauce@cpumag.com.

**This month I have
a sack full of
tools/services to
stay on top of
major and minor
software upgrades.**

Words From The Web

YEAH, THEY *ACTUALLY* SAID THIS . . .

From a Yahoo!
Surfing The Web chat room:

**We got a moron
in here
tonight, eh?**

*Just tonight?
Where have you been?*

From an MSN 20s
chat room:

**Lets stop saying
hi to each other**

. . . Or stop talking altogether



From an Excite Trivia chat room:

**Does this look
infected to you?**

*Dude, keep your
pus to yourself*

Post on American Idol
message board,
responding to another
post that Simon is
too judgmental:

**A judgmental
judge?! Whoa!**

*Now if only Paula
would catch on . . .*

A Cut **Above** The Rest

Spring is setting in, Fringe readers, and with the arrival of spring one begins to hear, from not-so-distant places, ripples of thunder rolling across the plains. That sound you hear is no April shower. It's the sound of racing fury—a concert of metal and raw horsepower struggling to be unleashed in one of the greatest competitions man has ever created: lawn mower racing.

This is truly the sport of kings, or their gardeners anyway. If you're uninitiated, head to www.letschow.com to learn more about the official organization of lawn mower racing, the USLMRA (U. S. Lawn Mower Racing Association). The site includes plenty of information about the sport, such as a race schedule, the official rules for lawn mower racing (blades are right out), and listings of points leaders for various race classes. The online photo gallery displays snapshots from past competitions. You can also search for a local USLMRA chapter. When you're finished installing the new RAID hard drive setup on your PC, dust off the John Deere, pump up that baby to a 20hp lawn rocket, and go head-to-head with other turf jockeys. Don't forget your helmet.

Infinite Loop

And The Winner Is . . .

TV stars compete for Emmy Awards, music artists compete for Grammy Awards, and Web designers compete for Webby Awards. Every year, members of the International Academy of Digital Arts And Sciences designate winners of the best Web sites in 30 categories. Check out some of the categories and the winners for 2002:

Education	www.exploratorium.edu
Fashion	www.zoozoom.com
Finance	finance.yahoo.com
Games	www.netbabyworld.com
Government & Law	lcweb.loc.gov
Kids	www.ology.amnh.org





Tasteless Treasures

Lava lamps! Inflatable chairs! Yanni!
Gold-plated toilet seats! This site
knows kitsch. Do you?

www.worldofkitsch.com

The New Science

Moviemakers often expect us to buy into ridiculous plots and questionable character development, but they really cross the line when they ask us to accept blatant violations of the laws of physics. Everybody knows that you can't hear space engines and laser shots in outer space, right? The Insultingly Stupid Movie Physics Web site (www.intuitior.com/moviephysics) calls out common movie physics faux pas, such as sparking bullets and cars that explode when they bump into, well, anything. The site explains the inaccuracies of these physics-bending movie staples and reviews several movies that are physics-ally challenged, such as "Spider-Man," "Independence Day," "The Matrix," and "The Bourne Identity."

oneword: write
oneword.invisibleland.tv

Muppet Madness

The Muppets have conquered stage and screen, taken Manhattan, and been to outer space. Muppet lore has grown well beyond the reckoning of most people, and so the Kermitage was established (www.kermitage.com). The episode guide for the Muppet Show recaps five seasons' worth of Muppet mayhem. Use the extensive character guide to remind you which old geezer is Statler and which one is Waldorf. Now that's high culture.



IF YOU FIND A STRANGE, INTERESTING, OR FUNNY WEB SITE IN THE COURSE OF YOUR INTERNET TRAVELS THAT YOU THINK IS WORTHY OF FRINGE, SEND YOUR SUGGESTION TO FRINGE@CPUMAG.COM.

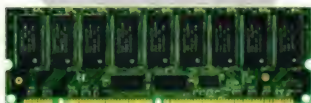


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More Than A Pretty Benchmark

Futuremark Measures The Future Of Computing

Will we really want to run benchmarks on our PDAs? Or maybe even our next-gen, 3G, color-display cell phones? Oh, sure we will. If anything is certain about our new digital world, it is that geeks like us always want—nay, *need*—to know whether we have the fastest, baddest toy on the block. The makers of the de facto standard in measuring the performance of accelerated PC graphics, 3DMark, know this well. They are building an entire business based on the PC lover's addiction to speed. They are unapologetic geeks themselves, and as new technologies emerge, they plan to be there with just the right measuring stick.

By Geeks, For Geeks

Known to video benchmarkers until its recent name change as MadOnion.com, Futuremark is tech geek to the core, founded five years ago by PC nuts and for PC nuts. Except for a small U.S. office based in Saratoga, Calif., much of the 25-person crew behind the company and its very popular Futuremark Web site (www.futuremark.com) chill out (literally) in the Silicon Valley of Finland, outside of Helsinki. Benchmarking isn't so much a vocation as a religion with these guys, many of whom began in the game development world (Remedy "Max Payne" Entertainment). Just as important, many of the best programmers in the Futuremark fold are veterans of "demo combat," an odd European subculture of competitive programming that goes back to the late 1980s and early 1990s.

Futuremark is best known to Webizens for its well-trafficked site, where literally thousands of users post their 3DMark benchmark scores. The site servers, along

with a small crew led by Tero Sarkkinen, president of U.S. operations and executive vice president of sales and marketing, are based in California. Overseen by Webmasters Nicklas "Worm" Renqvist and Jani "Demi" Joki back in the homeland, the Futuremark site has become a major



The new 3DMark03 takes a more cinematic approach to its game tests. In this Tomb-Raider-like sequence, various next-generation lighting effects help set the scene and create a mood for a demo sequence that will have a beginning, middle, and end.

destination for techies, where 1.3 million unique visitors hit the site in a normal month, typically racking up 60 million page views over a few months' time.

The main feature at the Futuremark site is the legendary ResultBrowser, the arena in which PC nuts around the globe post their benchmarks and then bicker endlessly over the results. The Futuremark site receives about 500,000 benchmark results a month, and the typical 3DMark user posts about three results. The 3DMark benchmark interacts directly with the Futuremark Web site, and the company puts a number of safeguards and validation procedures into both software and site to ensure that the numbers it receives are valid. For instance, alarm flags are set at the site when

a benchmark result is clearly out of the range of likely hardware combinations.

Nevertheless, it is the nature of the PC subculture that controversy accompanies all claims to special technical prowess. "Every time somebody posts the new high score, there will be many people who say it is not possible," says Sarkkinen. As a result, the Web crew does not depend solely on the technology to detect possible cheats. "Worm" and "Demi" monitor results carefully and often manually analyze flagged scores and other impossibly high results against the hardware specs involved to determine whether the report bears investigation. "It is important to keep an active human eye on it," says Sarkkinen.

The Serious Business Of Benchmarking

Of course the most important Futuremark offering is offline: The 3DMark series of hardware gauges that are ubiquitous in almost all video card reviews and benchmarks. Before 3DMark arrived in its first iteration nearly five years ago (3DMark03 became available just before we went to press in mid-February 2003), benchmarking had been a haphazard thing. Early PC freaks looking to measure the effectiveness of their Matrox vid cards or early 3dfx add-on accelerators resorted to Microsoft Flight Simulator, Quake's timedemo, the vertigo-inducing 3D Tunnel demo, or the endlessly bland 3D Winbench from Ziff Davis.

The MadOnion.com 3DMark series made benchmarking fun because its designers clearly had gamers in mind when they filled the test runs with sequences right out of the gaming universe: fly-bys of a "Blade Runner" cityscape or "Matrix-style

slow-motion shootouts in a marble-lined lobby. Just as important, Futuremark deliberately tried to overcome the limitations of traditional benchmarking routines. Although in-game frame-rate counters remain the main competition to 3DMark, they are notoriously unreliable because most game engines are tuned specifically to take advantage of a narrow range of very popular hardware. But as the company discovered, designing a benchmark that is at once fun, comprehensive, and truly impartial involves an enormous amount of time and investigation before the first line of code is written. This is serious business. And as the company also discovered when it finally did release its 3DMark03 into a blizzard of controversy in early February 2003, benchmarking is also a high stakes business that may never satisfy everyone all at once.

In order for 3DMark to be a credible, objective test of system hardware, it must jump some high and costly hurdles.

Futuremark engineers must ensure that the test is hardware neutral, in that unlike many game benchmarks, it does not favor any hardware combination or video chipset over another. At the same time, it must anticipate the gaming and video card feature set that will dominate the field for the 12 to 18 months after the benchmark launches. And finally, it must run flawlessly on the infinite hardware combinations that make up the PC world.

This inherent complexity is why it takes up to two years to develop each version of 3DMark. The company times a new release to follow every generation of Microsoft's DirectX API.

Anatomy Of A Benchmark

The beginning of a benchmark design cycle is more relaxed and contemplative, however. "It all starts with basic research," says Sarkkinen. About two years before a new version of 3DMark emerges, the

company is scanning the gaming field to determine which graphics features are likely to matter most in games two years down the line. The company distributes questionnaires within the industry to get a range of opinions about what benchmark would best measure the video functions designers are most likely to use. The company's partnership with Microsoft is very close and absolutely critical to 3DMark's success. Futuremark designers know well in advance the likely feature set for the next DirectX API. "We need to narrow the funnel and think which workloads represent gaming in the next two years," says Sarkkinen.

A sophisticated benchmark such as 3DMark is a kind of crystal ball into the near future of gaming graphics because much of the effort is "to ensure that they remain valid through the life cycle of the benchmark, which typically is between 12 to 18 months," says Aki "A.J." Jarvilehto, VP benchmark products. Many 3DMark users stare at this benchmark and ask why their games can't look this good; they will start looking this good, in about a year.

Knowing the basic DX9 feature set well in advance, for instance, helped Futuremark develop an initial set of specs for the 3DMark03 tests that were as independent from specific hardware or software as possible. For 3DMark03, the inclusion of vertex and pixel shading capabilities in DX9 now allowed Futuremark to design its benchmark to run on top of the API. Previous versions had to access vertex and pixel shading by running under the intermediary technology of the MAX-FX 3D engine.

Now running on DX9, 3DMark03 introduces version 2.0 of Futuremark's vertex shaders to depict movement in individual leaves in one of the benchmark sequences, for instance. For rendering a lake surface, a new pixel shader routine lets the benchmark layer numerous texture maps onto a lake surface: A map to render ripples, another to render light refractions, yet another for reflecting distant objects, and finally a map just to calculate transparency.

The Invisible Gauge

And transparency is exactly the principle Futuremark believes sets it apart as a

Top Brass

Tero Sarkkinen came to head the U.S. offices in 2000. He is executive vice president of sales and marketing at Futuremark.

CPU: You guys make such amazing demos for 3DMark, why aren't you developing gaming engines yourselves?

Sarkkinen: We spun off from Remedy Entertainment, makers of Max Payne, when making benchmarks started to interfere too much in making games. We often have people ask, "Where can we buy this game?" Partially because of that kind of feedback in 3DMark Professional, we enabled a small game where you can control the car in one of the game tests.

CPU: Is there any direct competition for 3DMark?

Sarkkinen: Sure. What we regard as competition is what the magazines or consumers use to deter-



mine performance. Currently, the most popular 3D games are our competition.

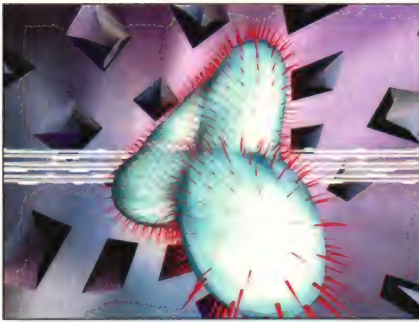
CPU: You mention that Futuremark makes much of its revenue from member fees to your BETA Program. Why do companies pay you to help you make your benchmark?

Sarkkinen: They are paying to get their voice heard. They are able to give their input into which are the most important technologies in

the two years to come. We make sure that our software runs without glitches on the hardware they are developing. That is a big part of our business model.

CPU: You are best known for 3DMark, but now you have a full system benchmark?

Sarkkinen: We launched PCMark in March 2002. It's our newest benchmark, and we are just thrilled by the rapid acceptance it is gaining. Just months after releasing, we looked at online PC performance reviews, and in 73% of them, PCMark was used. Of course, it is nowhere near where 3DMark is, but we have had 3DMark out for nearly five years. ▲



Many of Futuremark's best programmers cut their teeth on the Finnish demo scene, where programmers competed to squeeze the most dazzling computer imagery and sound from currently available PC hardware. "Demo combat" in northern Europe still produces hallucinogenic stunners such as this "Amoeba" animation from a well-known demo team.

reliable, impartial benchmark. Futuremark is obsessively secretive with the public when developing a new benchmark, but it is just as obsessively open about the process with the companies whose hardware will be measured by it. These BETA Program members test and comment upon the benchmarks at every milestone of development. "We try to ensure that no one is surprised by the end results," says A.J. "We believe that the only way to build neutral benchmark software is through a transparent process like this, where all manufacturers have both visibility in our development process and the possibility to give feedback about the innovations that they see in the near future."

Once Futuremark researches and polls the industry for its predictions about the future of 3D graphics, the company creates a "proposal for specifications," a video feature set it proposes to measure in the next benchmark release. BETA Program members then respond to this document before Futuremark designers and coders even begin to devise test sequences or write code. With 3DMark03, the company will enhance the transparency of the process with other developers and even consumers by publishing a series of white papers that explain the technology behind each test.

Futuremark's core principles of transparency and objectivity make for a long and costly development cycle, and until early

February 2003, most of the top hardware vendors supported the company's end product. With the release of 3DMark03, however, NVIDIA balked, complaining publicly that Futuremark's benchmarks were less than impartial and less effective at measuring real-world 3D performance than using games themselves. (See the NVIDIA Pulls Away sidebar.)

Nevertheless, in deciding which 3D features will be most relevant a year or two out, Futuremark claims a good record, mainly because it is working so closely with the hardware manufacturers and game



Futuremark shows us the FPS of the near future. Not only will DirectX9's lighting and shading ratchet up the realism another notch, but we may also finally see detailed, expressive faces that add drama and pathos to scenes.

developers. As a safeguard, however, A.J. says that 3DMark is designed deliberately in two pieces. A set of game tests involving the most relevant 3D features determines the actual 3DMark score. Other "feature tests" help determine whether a user's hardware can handle some emerging technologies, but it doesn't apply these measurements to the final score. "This way, if we're not quite certain when a given technology will be used by a majority of game developers, we can always introduce it as a feature test and wait until full-blown support has actually happened," says A.J.

Both Pretty & Purposeful

The real achievement of 3DMark may be that it marries technical programming prowess with a strong aesthetic sensibility. "We think that people should see something spectacular while they are testing what their systems are capable of," says A.J. Users

of 3DMark03 will not be disappointed. This time out, the game-test sequences actually get game-like titles. One scene looks as if it could be out of the upcoming Tomb Raider, except that the strands of the heroine's hair move independently, a test that pushes the envelope both of video rendering speed and our expectations from a game. "Benchmarking should actually be just as fun, exciting, and adrenaline-filled as high-level computing performance is," says A.J.

Sometimes, aesthetics must relent to good benchmarking principles. For instance, in early builds of 3DMark03,

post-processing "blur filters" added a pretty luminance to light sources in some tests, an effect A.J. believes we will see in games by the end of this year. But late in development, the team discovered that DX9 would not support post-processing and full-scene anti-aliasing in simultaneous mode, which might amount to a 3% performance drop for those running the benchmark with FSAA enabled. Rather than complicate the instructions for the benchmark and suggest different settings for optimal performance, A.J. & co. took the "blur filter"

effect out of the standard suite and made it an optional effect. "We first and foremost want to ensure benchmark accuracy. Our second and also very important goal is to make the benchmark experience an enjoyable one," he says.

Is There Money In This?

But how do these guys stay afloat? Consumers can pay \$30 for a Professional version of 3DMark (including a small game and more detailed measurement and reporting features), but the overwhelming majority of us are happy to download the free set of basic benchmarks. Where is the money in this for Futuremark?

"We're pretty much the only ones who have figured it out," says Sarkkinen. "We get most of our revenues from our BETA Program member fees." Yup, hardware vendors such as ATI, Intel, and (until recently) NVIDIA actually pay Futuremark

NVIDIA Pulls Away

Controversy erupted online the day that Futuremark released its 3DMark03 in early February. In a move that surprised U.S. Futuremark head Tero Sarkkinen, NVIDIA announced that it did not support the new benchmark. In various releases and interviews with several tech sites, NVIDIA executives complained that the DX9 wrapper 3DMark03 used forces NVIDIA to rewrite drivers just so that they run well on the benchmark but not in ways that benefit the users in games. Futuremark had not heeded the video card vendor's advice in the final stages of development, NVIDIA claimed.

Sarkkinen admits that NVIDIA had canceled its membership in the Futuremark BETA program in December, well after the feature set had been set and agreed upon by all members last summer. "We certainly hope and believe that we will be working with them in the next versions," says Sarkkinen. "We are also a bit baffled by their actions on this."

Alas, NVIDIA is not alone in challenging Futuremark's interpretation of good video card performance. As we went to press, several of the major hardware review sites voiced reservations about the latest release. ZDNet's ExtremeTech.com criticized the benchmark, as did NVIDIA, for relying too often on pixel shading routines that ATI alone supported. Tom's Hardware argued that the new benchmark was less useful than previous versions and that some of the test suites had become less comprehensive and reliable than previous versions. Kyle Bennett, co-Webmaster of HardOCP (and *CPU* columnist), said his site would be using 3DMark03 in evaluating video cards for the time being.

Although it is still too early in the controversy to understand its long term implications for Futuremark and benchmarking generally, more than a few Futuremark critics agreed with NVIDIA that ultimately gamers should be using games as benchmarks of video speed and quality. It seems as if it is now up to Futuremark to prove the case for synthetic benchmarking. ▲

to be part of the benchmark development process. But these guys aren't just smart at programming. Part of "figuring out" how to make money off a business with 3D benchmarking at its core is learning how to expand the product base and leverage all of that market data Futuremark collects from its well-trafficked site.

Over the years, Futuremark has gathered specs and benchmark results from more than 5 million PCs, so now it is exploiting that unrivaled database in a number of ways. At any time, the Futuremark site offers a snapshot of the current state of user hardware. Here at *CPU*, we may be salivating over the NVIDIA GeForce FX or ATI RADEON 9700 Pro, but according to Futuremark, the most common video processor reported on its site is the GeForce4 Ti 4200 (14% of results reported) with the even pokier GeForce3 Ti 200 (11%) and RADEON 8500/LE (11%) close behind. Likewise, the most common processor among users at the site is still the AMD Athlon XP 1500 (12%). This is the sort of market information that game developers and PC makers will pay serious money to learn, so Futuremark sells much more detailed reports on the state of the average PC owner to them out of the database generated by the site.

Measure Everything

Futuremark is looking forward and trying to be the benchmark of choice for a range of hardware. Its PCMark suite of total system measurements is already boasting traction among reviewers and hardware vendors.

The company is also combining its Web prowess with its mammoth database of user configurations and benchmarks to create the Performance Analyzer. This Web-based tool lets hardware vendors scan more than 300 attributes on a PC and estimates its general speed so that the seller can compare a buyer's current performance to the speed he might realize from specific upgrades. A similar product, SupportMark helps vendors such as NVIDIA assess a user's hardware setup

from the Web and streamline customer support for the user and the company.

The generally tight-lipped company also admits that it is ready to benchmark a wide variety of increasingly popular gadgets, including speed gauges for PDAs and perhaps even cell phones.

Despite all of these efforts to diversify beyond 3D benchmarking, the most common question the company fields from users and press like us remains: Why not translate some of those dazzling benchmark



Lights on. 3DMark03 puts the newest light and shadow rendering technologies to the test in a scene that stretches the hardware and engages suspense at the same time.

engines into blockbuster games? Of course, for some of the original MadOnion.com crew, they have already been there and done that. But at Futuremark's heart is a somewhat different set of ambitions that seems to come more from its roots in the demo world of the early 1990s. Here programmers wrote code that at once dazzled the senses, showcased their talents, and also demonstrated just what a PC could do.

These are the guys who have the PC bug; they feel the juice of making technology run quickly and beautifully. As A.J. puts it, "It's very exciting to be working on the leading edge of PC technologies and do what little we can to show these technologies to consumers and the public through benchmarks." **CPU**

by Steve Smith

Many of Futuremark's founders spent their early days on the European demo scene; subscribers can read about it at www.cpumag.com/cpuapr03/benchmark.

XSLT Part IV: Sorting & Looping

In *Coder's Corner: XML*, Ian Graham shows you how to program with XML. Ian is the author of numerous books pertaining to Web development, including *The HTML Sourcebook* and *The XML Specification Guide*.

Last month, we detailed how XSLT can transform XML data into HTML. The stylesheet we used transformed item elements into a similarly ordered sequence of HTML table rows:

```
<data>
  <item>
    <name>Marie Curie </name>
    <birthday>7 November 1897</birthday>
    <birthPlace>Warsaw, Poland</birthPlace>
    <favoriteColor>green</favoriteColor>
  </item>
  ... more items ...
</data>
```

This approach is fine, but it can only reproduce the order of the original XML item elements. You'll often want to reorder data, however. XSLT makes this easy. To illustrate how, we'll add some simple sorting and reordering to last month's example, plus introduce these XSLT elements:

- `<xsl:for-each>`, which provides looping control over a list of nodes
- `<xsl:sort>`, which defines a rule that sets the order the nodes in the node list are processed

Sorting rules often require substantial manipulation of strings, so we'll also look at some important string processing functions in XSLT/XPath.

Original Main & Row-Generating Template

Last month's main style template was:

```
<xsl:template match="/">
  <html> <head>
```

```
  <link rel="stylesheet" type="text/css" href=
    "styledata.css" />
```

```
  <title> Some Interesting information about
  <xsl:value-of select="count(/data/item)"> famous
  physicists </title>
```

```
  </head> <body>
    <table border="1">
      <tr><th> Name </th> <th> Birthday </th>
    <th> Birthplace </th> </tr>
    <xsl:apply-templates select="/data/item" />
    </table>
  </body></html>
</xsl:template>
```

The `<xsl:apply-templates />` element recursively processes all the document's item elements, generating the table rows. Applying the item element template produces each row, which we won't change:

```
<xsl:template match="/data/item" >
  <tr bgcolor="{favoriteColor}" >
    <td> <xsl:value-of select="name" /> </td>
    <td> <xsl:value-of select="birthday" /> </td>
    <td> <xsl:value-of select="birthPlace" /> </td>
  </tr> </xsl:template>
```

To sort the output, the stylesheet must change the order that the row-generating template is called. That is, the `<xsl:apply-templates select="/data/item" />` element must change so that the templates are applied to a sorted sequence of item element nodes.

It's easiest to illustrate sorting by explicitly looping over the item elements in the main template, one at a time. We do this by replacing the original `apply-templates` markup, `<xsl:apply-templates select="/data/item" />`, with an `xsl:for-each` element:

```
<xsl:for-each select="/data/item" >
  <xsl:apply-templates select="." />
</xsl:for-each>
```


This does the same thing as the original markup. The `xsl:for-each` selects each item element in the node list, one at a time, and the internal `xsl:apply-templates` applies the appropriate template to that node ("."). Making the loop structure explicit makes it easy to see how sorting rules are attached to the loop to change the processing order.

To add a sorting rule to the loop, place an `xsl:sort` element inside it:

```
<xsl:for-each select="/data/item" >
  <xsl:sort select="name" />
  <xsl:apply-templates select="." />
</xsl:for-each>
```

`xsl:sort` adds a sorting rule, meaning the attributes define the sorting rules. The rule is simple: The node list of item elements is ordered according to the string value of the name element inside the item elements (sort rules always sort by string or numeric values). By default, `xsl:sort` sorts things alphabetically, so items are ordered in ascending alphabetical order according to the string inside the name element. The HTML table rows output as follows:

```
<tr bgcolor="blue"> <td> John Wheeler
</td> ..... </tr>
<tr bgcolor="yellow"> <td>Hans Bethe
</td> ... </tr>
<tr bgcolor="green"> <td>Marie Curie
</td> ... </tr>
<tr bgcolor="orange"> <td>Otto Frisch
</td> ... </tr>
<tr bgcolor="blue"> <td>Richard
Feynman </td> ... </tr>
```

The last four items are correctly sorted; the first isn't. It should be second. This happens because the `<name>` element has a space in front of "John"; the others don't. In XSLT, white spaces are "real" characters; `xsl:sort` sorts the name strings accordingly.

Remove White Space

The XPath `normalize-space()` function removes white space. XPath contains several functions for manipulating and processing strings. The `normalize-space()` function takes a string as an argument and produces a normalized string by removing all leading spaces, removing all trailing spaces, and replacing any sequences of one or more space characters by a single space.

To use this in the stylesheet, change the `xsl:sort` element to: `<xsl:sort select="normalize-space(name)" />`

Sorting is now done using normalized string values, and the names are sorted in the desired order. Although the `xsl:for-each` mechanism makes the example easier to understand, you can include the same sorting rule using `xsl:apply-templates`. (`xsl:sort` can appear in only two places, including inside an `xsl:for-each` or an `xsl:apply-template`.) With `xsl:apply-templates`, you write:

```
<xsl:apply-templates select="/data/item" >
  <xsl:sort select="name" />
</xsl:apply-templates>
```

The `xsl:apply-templates` process the selected nodes using the appropriate templates, but the `xsl:sort` rule defines the order the nodes are selected. In either case, when an XSLT processor sees `xsl:sort` elements, it uses the sort rule to determine the sort order for the node list of the parent `xsl:for-each` or `xsl:apply-templates` element. It then executes the loop, using the sorted order.

By default, `xsl:sort` orders things in ascending alphabetical order. You can reverse this using the `order` attribute. The default is: `order="ascending"`. To list the names in reverse, the markup becomes:

```
<xsl:sort order="descending" select=
"normalize-space(name)" />
```

The `case-order` attribute controls whether uppercase letters are sorted before or after lowercase ones. Thus, the following means that in ascending order, uppercase letters sort before lowercase ones, while `case-order="lower-first"` reverses this: `<xsl:sort case-order="upper-first" select="normalize-space(name)" />`

Default, uppercase, and lowercase sorting rules are language-dependent. To choose language-dependent sorting, XSLT provides a language attribute property that causes `xsl:sort` to choose rules appropriate to the specified language. This rule will sort items assuming German language ordering rules: `<xsl:sort lang="de" select="normalize-space(name)" />`

Numerical Sorting

By default, `xsl:sort` sorts alphabetically, but the element also supports `data-type`

`= "number"`, which specifies numerical sorting (the default is `data-type="text"`). In this case, XSLT treats sorting values as real numbers and sorts them in ascending or descending order. For example, the source XML provides the birth year (in the birthday element). Maybe you want to display the rows by birth year. Unfortunately, the birth year is embedded at the end of the string with the day and month. Sorting according to year requires extracting the appropriate string portion from the birthday element value and sorting according to that.

Fortunately, XPath provides many string manipulation functions. Here, we need `string-length()`, which returns the length of a string and `substring()`, which extracts a substring from a string. For example, `substring(foo, 5, 4)` extracts four characters from the string named 'foo', starting with the character at position 5. (The first character in a string is at position 1.)

The goal is to extract the four-digit year from the value of the birthday element. That's possible by taking the string's last four digits because every string ends with the four-digit year. This is only true after normalizing spaces in the string because the values sometimes have space characters after the year and before the end tag. The appropriate `xsl:sort` expression is:

```
<xsl:sort data-type="number"
select="substring(normalize-space
(birthday),string-length(normalize-space
(birthday))-3,4)" />
```

The `normalize-space()` is used to remove the extra spaces. The expression `string-length(normalize-space(birthday))-3` returns the length of the birthday string, once the extra white space is removed. It then counts three characters back to give the position, within this normalized string, of the year's first number. The `substring()` function then takes the normalized string and, starting from the beginning of the four-digit year, extracts the last four characters, yielding the four-digit date string. 

by Ian Graham

(NOTE: Full examples of the documents in this article are available at www.utoronto.ca/ian/articles/apr03.)

M A D E W I T H N O
L I M I T S I N M I N D

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Web User Personas

An effective Web site anticipates and supports the kinds of tasks your customers will perform during their visits. As obvious as this sounds, designing such a Web site is not a walk in the park. For example, if your site offers vacation packages, you must think through the user's process of information gathering through to making a reservation. Anticipating the needs of different types of users further compounds this process. Older couples, single people, and families may all go about the process a little differently and need different kinds of information along the way.

So, how do you begin to address these needs? One of the first steps in the Web design workflow is creating a set of "user personas." A persona is a short description of one of your typical users. The description answers the "who, what, why, when, and where" questions and gives an insight into the user's personality. Though fictitious, the goal is to humanize each type of user. Many persona lists include a picture of the person (usually a stock photo), the person's name, nickname, quirks, motivators, and barriers. It answers questions such as what their financial concerns are and any particular needs they have.

Guiding Site Structure

You should create a set of personas—one for each of your user types—before you begin the information design process. The personas will help shape the structure and navigational flows of the site. For example, information designers will use the personas to think through the overall structure of the site: What things should go in the global navigation bar? If you have three different kinds of users, should the global nav provide three different ways of getting to similar content?

From the personas, the information designers will also develop "user flows" through major

tasks. For example, how will Trisha the single mom start at the home page, find an appropriate vacation package for herself, and end up booking something that has child care services?

A well-developed set of personas not only aid in the information design, but they also help the graphics team create a look and feel that appeals to the kinds of people who will be using the site.

Guiding Usability

Ultimately, a good set of personas also becomes a good measuring stick for a site's usability. Personas will help you recruit the right kinds of people for your user tests, and they will determine the kinds of testing prototypes you should produce. For instance, recall in previous columns the discussion of developing click-through prototypes for user testing. A click-through is a collection of static screens that illustrates a path through a particular task. Basically, a click-through is a realistic-looking user flow that you can put in front of users to get a reading on the effectiveness of the navigation, interaction, and visual design.

Without the use of personas, designing effective user flows through your site would be nearly impossible, and you risk ending up with a site that does not serve your customers' needs or your business objectives. For more in-depth reading on the importance of developing personas as the first step in a customer-centered Web design process, take a look at Alan Cooper's "The Inmates Are Running the Asylum." ■

You can contact Lisa at lopuck@cpumag.com and see her work at www.lopuck.com.

A persona is a short description of one of your typical users. The description answers the "who, what, why, when, and where" questions and gives an insight into the user's personality.

Lisa Lopuck, www.lopuck.com, is a Web creative consultant helping companies define and plan their Web creative strategy, information flow, and visual look and feel. She is also the author of numerous best-selling books on Web design, including "Web Design for Dummies," and is a sought-after speaker at Web conferences and universities around the world.

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Rob "CmdrTaco" Malda is the creator and director of the popular News for Nerds Web site Slashdot.org. He spends his time fiddling with electronic gizmos, wandering the 'Net, watching anime, and trying to think of clever lies to put in his bio so that he seems cooler than he actually is.

If you're like me, you spend most of your time communicating with other people through your computer. You might say I'm a junkie. I wake up every morning with a few hundred emails. Sure, most of them are spam, but I still need to write many emails each and every morning. OS X's Mail.app is a nice start with its reasonably successful spam-filtering tools and easy address book, but I'm an addict. I am always looking for my next fix.

As my day continues, I find myself logged into IRC (Internet Relay Chat). These days I'm using X-Chat Aqua as my primary IRC client on my Mac, which is a fairly straightforward port of my favorite X11 Client. I sit in a few channels on a couple of networks. Some of my groups are for fun, but most are channels dedicated to the technical and editorial aspects of the day-to-day maintenance of the site.

Then we have IM. Apple's iChat is a reasonable IM client—its integration with the address book is very helpful, and all the usual controls are there: Buddy Lists, Ignore Lists, etc. And they are essentially all redundant to those that I find in X-Chat Aqua. So far, I've yet to find a real-time chat application that has true OS X integration and provides full functionality for all the major IM networks, as well as IRC.

So I've got three applications sucking up RAM on my desktop. And there is a certain level of redundancy between them. And we're not done yet. I haven't started talking about the whole "Phone Situation."

I hate phones. Sometimes they are essential, but most of the time, they are extremely inefficient. The real-time nature of the phone requires that both people are available to pay attention. And worst of all are the horrid interfaces required to use them to full advantage, from the messy, deeply nested digitized voice menus to the PINs and 10-digit phone numbers.

But that's not cruel enough. No. I have three phone systems: Home, Office, and Cell phone. And each is subject to various unique forms of solicitation. It's a simple deal to add a user to my ignore list in IRC. It's just as trivial to reject email addresses in most major mail clients. But phones simply suck—not only do they ring even if I get a call from an "Out of Area" number, but I have that problem for each number.

Now progress is being made. The latest generation of cell phones come equipped with Bluetooth network connections that let you share your address book or send a known pest straight to voice mail. But that just isn't enough. What I'm talking about is a truly unified piece of software that brings together all major forms of communication. The inbox in Mail.app seamlessly brings together mail from several sources. Using known protocols such as IMAP and POP, I am able to bridge together several email addresses and accounts. Why can't my voice mails be included in that list?

There are several types of instant messaging, ranging from my cell phone to ICQ. Why can't they all work together, sharing the same rulebook? A unified ignore list. A shared address book. A trusted co-worker should have but one entry in one address book. The entry should know his IRC nickname, his ICQ number, all of his phone numbers, and known Caller-ID signs. Now suddenly I know who's contacting me, regardless of the communication mechanism. I can be notified if he's left me voice mail or simply see my IM.

The user interface to this system varies depending on what technology you have available. Modern cell phones have true

IMAP support, and it seems to me that this is a great place to start because it is very standard and supported on all platforms. PDAs will develop further and improve the situation.

I think it's critical that this problem is solved soon and using open protocols. Between IMAP, XML, OGG, LDAP, VCF, and DAV, it seems clear that bringing together email, instant messaging, and voice communications is inevitable. But it needs to happen soon. Every day new Web sites sprout up. And each implements its own system of address books, ignore lists, and spam filtering. With each additional delivery mechanism and data type, the problem compounds itself.

I'm a confirmed communication addict, but the tools shouldn't stand between me and the world. ■

What I'm talking about is a truly unified piece of software that brings together all major forms of communication.

Feed my addiction at malda@cpumag.com.

Google Blogs

No longer the plucky underdog of search engines, Google's (www.google.com) global status was recently confirmed when it earned the top slot in an online survey of brands that had the most impact on respondents' lives in 2002. That will someday be viewed as an understatement.

As the most utilized search engine on the planet, Google has an enormous amount of power to direct traffic. Even now, if a site does not get a high PageRank (Google's constantly evolving proprietary method of rating a site page based on several criteria, including the number of links leading into the site and the PageRank status of the linking sites), it almost doesn't exist. This is considered a good thing because why would you want results that list a page nobody else thought was interesting enough to link to? Grumbles by site owners about rankings being lowered or even zeroed out have only resulted in one lawsuit being filed against Google, which is hardly worth mentioning except that it does illustrate the power of PageRank.

Now that Google has acquired Pyra Labs, makers and breakers of Blogger software (www.blogger.com), speculation is getting interesting. Google's acquisition of Deja.com two years ago and the subsequent republishing of the Usenet archive may bode well for Google's treatment of massive amounts of "little guy" content. Egged on by better technology and plenty of complex global news events worthy of discussion, dissection and conspiracy theorizing, blogs have become mainstream over the past year. It is even arguable that the role of bloggers in researching and analyzing breaking news has led to changes not only in the way news is perceived, but also in the actual outcome of events. The future combination of Google News (www.news.google.com), the auto-assembled

news service launched last fall, PageRank, and Google Blogs (or whatever they end up calling it) could be something quite impressive. Think of it as real-time distributed news analysis with a built-in rating system.

That might be useful to you. And the blogger tendency to reference other bloggers and cross-link related topics is a veritable gold mine of filtered PageRank data. Imagine Google tracking the link thread from your initial Google Blogs query through to each successive click from blog to blog (all housed on Google blog servers and under Google Privacy Policy jurisdiction, of course), saving the track and offering track searches. That would certainly be useful to Google. Using the brain sweat of hundreds of thousands of actual bloggers and the interests of millions of actual Google track searchers, it employs existing Google technology to expand Google's core service into another dimension. Winners all.

Of course, there is always a dark side to things: Google already

keeps track of your search queries and which links you go to from any Google page. It logs time of day, browser type, browser language, and IP address with each query. So a complete collection of searches made on your machine or from your IP address is stored somewhere. Therefore, a complete collection would also exist of all searchers for any query or linked destination. That could be useful to some oppressive (or just paranoid) regime that happens to be in power wherever Google is operating. And according to Google Watch (www.google-watch.org), the Google cookie sell-by date is 2038, which leaves a long time for even benevolent powers to change. ■

Track me at joan@cpumag.com.



Starting as gopher for the Emmy-winning team that pioneered live in-car TV cameras for the Indy 500, Joan became an independent video/sound engineer, technical director, and producer. Playing with Reality Engines and motion platforms led to co-founding Xatrix Entertainment, where she produced the two Cyberia games. Before 3D acceleration was trendy, she formed Mango Grits to develop hardware-only game Barrage for Activision. Since cashing out from SharkyExtreme.com, where she was co-founder and managing editor, Joan has retired.

My Account

WELCOME, MIKE ALLEN
STATUS: GOLD
MILEAGE BALANCE:
139,237

Net SAAver Alerts

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TO: ST. THOMAS, VI
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Flight Status Notification

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Road Warrior

So Long Graffiti, Cell Phone Doom, Last Mile Wireless, Portable Phone Numbers & More
From The Mobile Front

Swiss Army PDAs

What we'd really like to see is a Palm device with a satellite tracking system that could help us find our Palm beneath the stacks of press releases and TPS reports on our desks. Failing that, the Garmin iQue 3600 (www.garmin.com/products/iQue3600/#) is a pretty nifty example of convergence. The iQue is a Palm OS 5 device that includes integrated GPS.

We're not just talking about knowing your latitude and longitude. The iQue 3600 includes mapping software and voice navigation so you won't miss that right turn at Albuquerque again. Integrating GPS with the PDA features of Palm OS 5 lets you automatically map contacts and appointments for which you've entered an address.

The iQue 3600 includes a 320 x 480 color display for large, crisp maps. There's also an SD card slot, 32MB of RAM, and a voice recorder. The device should be available in Q2 with a suggested retail price of \$589.

In other integration madness, Sony's NZ90 should now be available. The PDA is the successor to Sony's PEG-NX70V, which combined Palm OS 5 with an integrated camera. The new NZ90 includes an upgraded 2-megapixel camera capable of UXGA (1,600 x 1,200) resolutions. The PDA has the same clam-shaped design as its predecessor, with a 320 x 480 display on one end and keyboard on the other. The NZ90, however, won't come cheap. It's available from Sony (www.sonystyle.com) for \$799.99.

The Wireless Neighborhood

Forget about the wireless office. Imagine linking an entire neighborhood, town, or city together without running a single cable. In January, the IEEE (Institute of Electrical and Electronics Engineers) Standards Association (standards.ieee.org) approved the 802.16a specification, an extension of 802.16. 802.16a provides wireless broadband access between 2 and 11GHz, extending 802.16's initial 10 to 66GHz band.

Think of 802.16 as 802.11 on steroids. 802.16 will provide wireless access to users over greater distances than 802.11. The technology could be used to cheaply bridge the infamous last mile

Portable Phone Numbers

One of the worst parts about changing your phone service is the blank stare you end up giving someone when she asks for your new phone number. A new FCC rule change, however, requires mobile phone companies to let consumers take their phone numbers with them when they change services. The move is an attempt in part to spur competition among providers.

The CTIA (Cellular Telecommunications & Internet Association; www.ctia.com), however, feels the rule

should also apply to local landline telephone companies. The CTIA has asked for a declaratory judgment from the FCC, claiming that unless the FCC's rule also applies to landline operators, it will do little to increase competition between landline providers and cellular providers.

According to the CTIA, only one out of eight customers will be able to transfer her landline number to a wireless service if the local telephone companies are able to restrict transfers.



Garmin's iQue 3600 integrates GPS features into a Palm OS 5 PDA. The iQue 3600 lets you map contacts and appointments and receive voice directions to your destination.

between a network hub and the consumer's home. The technology could have a major impact in rural and unindustrialized areas.

There's likely to be some debate as to just where 802.16 (including 802.16a) will fit into the wireless picture, especially given the popularity of 802.11b, 802.11a, and the emerging 802.11g. 802.16 and 802.11 technologies may prove complementary, with 802.16 acting as a backbone for 802.11 access points. Regardless of how the wireless jumble plays out, we'll likely see a lot more technology beginning with "802."

The Writing Was On The Wall

You didn't have to be Nostradamus to see this coming. After a recent court ruling declared Palm's Graffiti violated patents Xerox held, PalmSource (www.palmsource.com) has said farewell to its Graffiti handwriting-recognition software. Graffiti 2 will replace it in all future Palm OS devices, even as Palm appeals the ruling. G2 has little in common with its predecessor. For G2, Palm licensed a version of Communication Intelligence Corp.'s Jot handwriting-recognition software. Microsoft also licenses a version of Jot for Pocket PC software.

The original Graffiti used a single stroke to represent a character. Because you can't draw all letters with a single stroke, users used a special script. For example, writing a "T" required drawing a horizontal line from left to right, followed by a vertical line. G2 accepts two strokes per character, so writing a "T" consists of drawing a single vertical line with one stroke. G2 may initially recognize the stroke as an "L," but when you draw the crossbar, G2 backspaces to erase the "L" and enter a "T."

G2 may cause problems with existing Palm apps, however. Apps that use shortcut commands to access options and menus, for example, may have problems in some cases. A user entering a "T" as a shortcut may trigger an "L" shortcut before the user can complete the "T." Autofill features may also encounter problems. You can fix most of these with a couple small tweaks by the developer.

G2 should be available in Palm OS updates from your device's manufacturer. Palm OS 4.1.2 will provide G2 for older Palm OS 4.1 devices. Palm OS 5 users should watch for Palm OS 5.2, which will also include an API for a collapsible Graffiti area similar to the writing area on Pocket PCs. Sony has tried a similar feature, but Palm OS 5.2 will provide a common API for all Palm OS developers and makers.



The Palm Tungsten T is likely the last device from Palm to ship with the original Graffiti handwriting recognition app. New Palm OS devices will feature the friendlier Graffiti 2.

Nokia 7650 Doomed

The Nokia 7650 is one impressive cell phone, which should automatically lead North American readers to assume it isn't available in this little portion of the world. That assumption would be correct, but we can look across the Atlantic and dream, can't we?

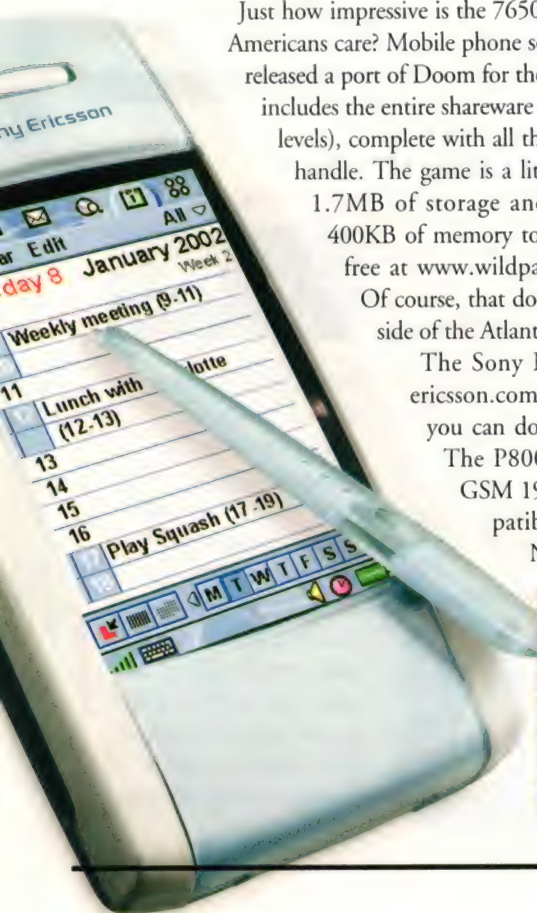
Just how impressive is the 7650, and why should we North Americans care? Mobile phone software developer WildPalm released a port of Doom for the 7650, that's why. The port includes the entire shareware version of the game (all nine levels), complete with all the beasts and bullets you can handle. The game is a little hefty, taking up roughly 1.7MB of storage and requiring an additional 400KB of memory to play. You can download it free at www.wildpalm.co.uk/doom7650.html.

Of course, that doesn't do us any good on this side of the Atlantic.

The Sony Ericsson P800 (www.sonyericsson.com) also has a Doom version you can download at www.yipton.net.

The P800 is a tri-band phone with GSM 1900 support, making it compatible with GSM networks in North America.

Remember when Doom required a desktop PC to run? Now the original Doom is running well on such cell phones as the Sony Ericsson P800.



Hands Off That Spectrum

The U.S. Supreme Court ruled in February that NextWave Telecom could keep the spectrum licenses it won in an FCC public auction in 1993. After making a down payment for the licenses, NextWave ran into financial difficulties. On June 8, 1998, the company filed for Chapter 11 bankruptcy protection and stopped payments to its creditors, including the FCC. After NextWave missed the payment deadline, the FCC sought to revoke and resell NextWave's licenses.

The Supreme Court ruled 8 to 1 that the FCC wasn't allowed to revoke NextWave's licenses. The court agreed with a lower court ruling in 2001 that section 525a of the U.S. Bankruptcy Code—which states that a governmental unit can't revoke a license issued to a person/organization under Chapter 11 protection for failure to pay a debt—applies in this case.

NextWave had planned to use the licenses to build a nationwide 3G network. Whether it is still pursuing such a business plan isn't readily clear. Regardless of NextWave's intentions, we'll be happy to see valuable bandwidth put to use rather than remain dormant for years as the government and NextWave squabble over legalities.

Allen Salmasi, NextWave CEO, has said the company plans to put the licenses to use "as quickly as possible," but he's made no comment as to how NextWave will take advantage of its licenses.

At Your Leisure



Plug In, Sit Back & Fire Away

The entertainment world, at least where it pertains to technology, morphs, twists, turns, and fires so fast it's hard to keep up. But that's exactly why we love it. For the lowdown on the latest in PC entertainment, DVDs, consoles, and just stuff we love, read on.

Unreal II: The Awakening The Next Big Engine (Until Doom III)

If you'll recall our recommendations from the UT review (page 91, January 2003), we noted that players interested in a single-player experience should wait for the release of Unreal II. Well, it's here. If you're looking for new gameplay innovations, look away. You'll find more fulfilling single-player experiences in No One Lives Forever 2 and Medal of Honor. However, UII's tried-and-true approach does have appeal. After all, the folks at Legend Entertainment designed it. These guys have degrees in adventure game design. (Remember such classics as the Spellcasting series, Gateway, and Eric the Unready, to name a few?) That background carries over here.

As you start on the first of 12 missions, you'll discover an entertaining story line mixed with tried-and-true gameplay and awful dialogue. All the groundbreaking innovation was saved up for the game's graphic engine, and what an engine it is. It's drop-dead gorgeous. Get used to seeing it; we're sure developers are already getting in line. When your character, Dalton, walks out of his training briefing, you'll have the chance to take in the unadulterated glory of the expansive outdoors: mountains, hills, and grass. It looks stunning; the visuals are enough to bring little tears to our eyes <sniff>. Just wait for the flame effects. Obviously, the designers felt moved by the flame effects, too. (You'll be seeing a lot of them in the 10 to 15 hours

it'll take you to play through the game at the Normal level.)

So what's not to like? After all the hype and excitement, the single-player game comes out as short and average. Sure, we loved the flying spider weapon, which shoots a swarm of biting spiders, the story line, and the graphics, but the game omits any genre-defining moments. Suffice it to say, UII is above average but comes from a pedigree that begets excellence. If you're a fan of FPS games, take a look.



Unreal II's eye-popping flame effects and creepy bad guys will wow you for a while.

Unreal II: The Awakening (PC)

\$49.99 • Atari

www.unreal2.com

DVD Byte by Todd Doogan

Just in time for the release of "X-Men 2" in May, Fox has gone all out and released an updated special edition of the first film featuring everyone's favorite merry mutants on DVD. Titled "X-Men 1.5" for no apparent reason, this disc is certainly loaded. It's the sort of disc Fox should have released the first time around. Containing most of the original material from the first set (Charlie Rose and Mutant Watch

took a header), the big news for fans is there's now a commentary track with director Bryan Singer onboard. Even bigger news is disc two of this two-disc set features a huge documentary about



the making of the film with interviews and behind-the-scenes footage pouring from every bit. The film itself has been retransferred, and along with the original sound selections, we get a nice DTS 5.1 track that serves the film quite well. If you didn't pick up the first set, this is a great buy, but it's your call if you want to upgrade your old set. ▲

Panzer Dragoon Orta A Classic Work Of Art

Let's get the bad out of the way first: Panzer Dragoon Orta is short. You'll find less than 10 hours of gameplay at the Easy setting. That's it. On the plus side, there's a host of extra goodies, unlockable features (including the Saturn version of the classic original), and graphics/sound that fully utilize the power of an Xbox. Top this off with an enjoyable arcade-style shooter, and we have a winner. Smilebit is the same development house behind the attractive Jet Set Radio Future, which we also ladled with glowing praise. They've really outdone themselves with Panzer Dragoon Orta.

The plot puts you into the tight pants of a girl by the name of Orta. Some of you lads may find this disconcerting, but get over it. After all, Orta's not a blatant Lara Croft-style character. Oh, and Orta rides a dragon. C'mon Lara, try that when you're done hanging blood vials

around your neck. The story is well told (especially for a shooter!), but impatient players can skip the cut-scenes (boo!) and go straight to gameplay. Don't let the rail-shooter style upset you.

Remember, this is an arcade shooter, and it succeeds admirably at what it does. As you fly along your preordained path, you'll be able to switch your view, accelerate/decelerate, and branch down other paths. In a market with stale retreads of past successes, Panzer Dragoon Orta is a gem.

As a game, Orta may *sound* light, but it's a lot of fun and the arcade aspect is no different than the classic arcade games of yore. You need to kill as many bad guys as



Destroy wave after wave of bioengineered horrors in Sega's excellent Panzer Dragoon Orta.

possible to raise your score. Somewhere along the way, it might slowly become obvious to you that a work of art is unfolding before your eyes.

Panzer Dragoon Orta (Xbox)

\$49.99 • Sega

www.sega.com/games/Segalmmersion.jhtml?PRODID=10079

Devil May Cry 2 Dante's Pique

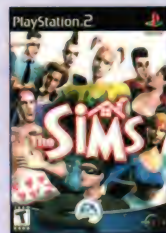
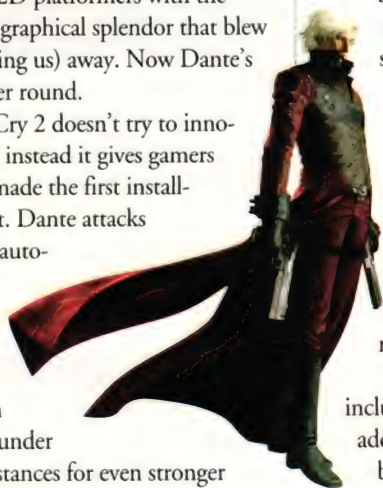
Back in late 2001, Capcom released Devil May Cry, a project that began as the next installment in the Resident Evil series but took a pretty radical departure. The game took 3D action gaming in a new direction, providing the tight control and level design of 2D platformers with the visual flair and graphical splendor that blew gamers (including us) away. Now Dante's back for another round.

Devil May Cry 2 doesn't try to innovate too much; instead it gives gamers more of what made the first installment such a hit. Dante attacks with twin semiautomatic pistols and/or a sword and can manifest the demon portion of his heritage under certain circumstances for even stronger

attacks. As in DMC, players can purchase powerups and new attacks between levels, and Dante stomps demon butt with panache, jumping to incredible heights, twisting and turning in midair, and looking cool all the while.

The story is pretty standard: A corporate bigwig is collecting mystical artifacts in order to take over the world or some such, and there's someone or something even bigger and badder pulling his strings. The good news, though, is that as in the first game, the story doesn't need to do much other than pull the levels together. Dante has a new partner this time around named Lucia, a mysterious fighter who likes knives. She wields them and throws them with equal aplomb and has some pretty fancy moves of her own.

DMC2 takes place in new levels, includes gruesome new baddies, and adds a bunch of new moves for Dante, but there aren't too many surprises



Check This Out On The Web

See our review of EA Games' *The Sims* (PS2, Xbox, NGC) at www.cpumag.com/cpuapr03/gamereviews.

here. If you enjoyed DMC the first time around, you should have a good time with



As in the first installment, Dante will spend lots of time fighting big, bad critters on land and in the air with pistols and a sword.

the sequel, as well. If you're unfamiliar with the series and like fast, atmospheric action games, you're in for a treat.

Devil May Cry 2 (PS2)

\$49.99 • Capcom

www.capcom.com/dmc2

War of the Monsters Really Big Fun

Anybody who says they don't like movies about giant monsters stomping through big cities and crushing everything in their paths probably lies about other stuff, too. OK, so Roland Emmerich's 1998 "Godzilla" was awful, but it's the exception to the rule. The crack team at Incog (makers of the excellent *Twisted Metal: Black*) taps into our love for these big lugs in *War of the Monsters* for PS2.

The game is pretty simple: You pick one of eight playable monsters (you can unlock a couple more) and pound your way through a series of matches with other hulking colossi. All of the classic giant monster archetypes are here, including a King Kong look-alike, a Godzilla-type critter, a giant praying mantis, a couple of enormous robots, an animated Mayan-looking statue, and a huge lava golem.

WotM gives you a few one- and two-player game modes to choose from, but the ones you'll probably spend the most time with are the one-player Adventure mode and two-player Free-For-All mode. Adventure mode is the standard fighting game mode where you fight your way through several matches to an end boss. If you beat the end boss, the game shows you a brief (but pretty cool) video clip explaining the



No game featuring giant, city-destroying monsters would be complete without a King Kong look-alike. Say hello to Congar.

origin of the monster you've been playing as. In addition, Adventure mode victories—and the destruction you cause along the way—earn you tokens for unlocking hidden characters, levels, and game modes. Free-For-All lets you choose how many computer opponents the game will throw at you and tosses you (and a buddy, if you like) into a super-sized slugfest.

Anything you can pick up and throw (cars, buses, etc.) is a weapon, and you'll have fun skewering your opponents with radio towers and watching them squirm.

As in the case of *Twisted Metal: Black*, WotM's story is relatively simple, serving only to keep the game moving from level to level and create a fun atmosphere. Incog apparently has this formula nailed because *War of the Monsters* is a blast.

War of the Monsters (PS2)

\$39.99 • Sony Computer Entertainment America
www.warofthemonsters.com

The Getaway London On 200 Bullets A Day

Given the immense popularity of the Grand Theft Auto games, it's little wonder *The Getaway* is one of Sony's most highly anticipated launches of the year. Of course, there are significant differences between the titles, but because both involve third-person gunplay, crime, and the ability to steal and drive any vehicle players encounter on the road, both games fall into a small but soon-to-explode genre.

Your character, Mark Hammond, is a retired bad guy who runs a club in London and just wants to be left alone, but a local crime boss named Charlie Jolson wants Hammond to do some jobs for him. To make sure Hammond complies, Jolson sends some thugs to kidnap his wife and son, but the kidnapping goes sour and Hammond's wife ends up dead. Hammond takes out several of Jolson's men in retaliation but is captured. Jolson explains that if Hammond wants to see his son again, he needs to do Jolson a few favors. From this point on, *The Getaway* consists

of a series of deadly missions interspersed with cut scenes that advance the story.

The game falls short of the current genre standard (*Grand Theft Auto: Vice City*) in a few areas. For one thing, you rely entirely on your vehicle's turn signals for navigation help, as opposed to GTA's on-demand city map and radar. True, GTA's map feature isn't terribly realistic, but Hammond is a guy who should know the streets of London intimately, so it's not very realistic for him to be at the mercy of a turn signal to get around, either. The game is also a bit too linear and offers little information as to player health and ammo amounts.

These foibles aside, however, *The Getaway* is a finely crafted game. The graphics are quite good, especially where buildings and cars are concerned, and developers Team Soho impressively re-created 40 square kilometers of London for Hammond to kick around in. The sound is good, and the voice work is even better. The game's controls when on foot are a little

flaky at times, but considering all of the moves Hammond can execute, they're not bad. *The Getaway* features great driving physics and offers plenty of variety among its large selection of drivable vehicles.



In *The Getaway*, you'll drive real vehicles around in a startlingly real London. Team Soho painstakingly re-created nearly 40 square kilometers of the city for your perusal.

In the end, *The Getaway* isn't as good as *GTA: VC*, but it is a pretty good game and should be on action junkies' short lists.

The Getaway (PS2)

\$39.99 • Sony Computer Entertainment America
www.us.playstation.com

Hot Shots: The Beauty Of The Game

Yeah, we know it's all about the gameplay. Sure, there are those who would have you believe graphics are relatively unimportant in the greater scope of things, but if you read *CPU* mag, you probably already know those folks are off their collective rockers. We want great gameplay combined with stunning graphics, and here are two upcoming games that show promise. Watch for them.



Majesco's upcoming 3D side-scrolling shooter, *BlowOut*, is slated for release on PC (shown here), Xbox, and PlayStation 2 this fall. The game will have a dark sci-fi theme and an industrial soundtrack to match its gritty visual style. All we want to know is: Where can we sign up? Majesco plans to include online multiplayer options and a level editor, as well.

Infinite Loop

Surfing For Dollars

What type of content are people paying for online? Match up the content types on the top with the revenue estimates on the bottom. Then check out the answers below.

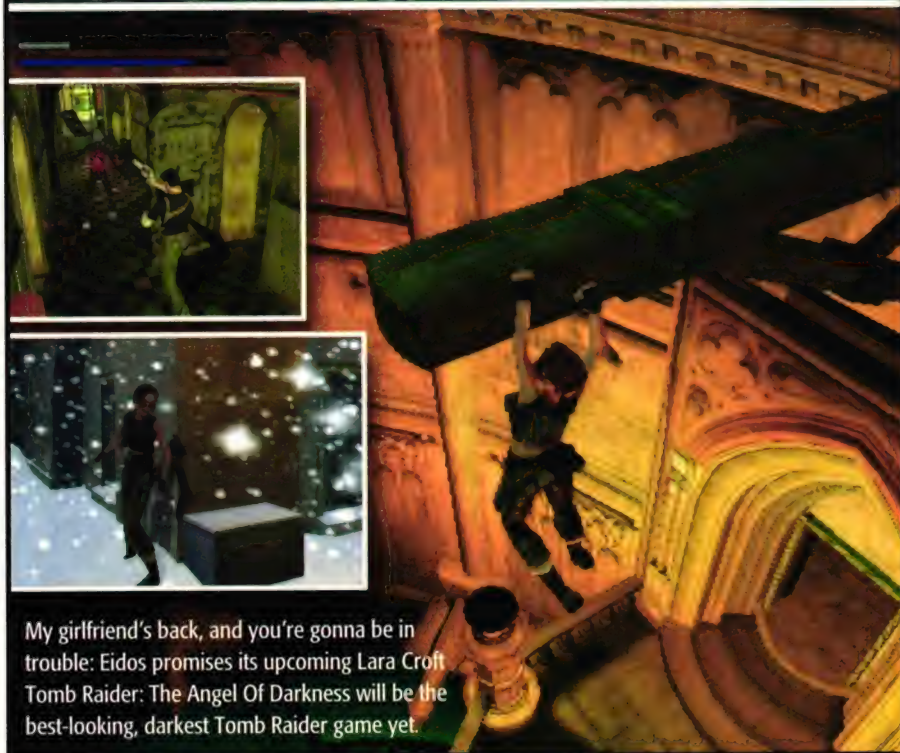
1. General Content
2. Adult Content
3. Online Gambling

- A. \$2.5 billion
- B. \$1.2 billion
- C. \$0.4 billion
(midrange eMarketer estimate)



Source: eMarketer, November 2002

(Answers: 1B; 2C; 3A)



My girlfriend's back, and you're gonna be in trouble: Eidos promises its upcoming *Lara Croft Tomb Raider: The Angel Of Darkness* will be the best-looking, darkest *Tomb Raider* game yet.

SOFTWARE TIPS & TRICKS

More Media Players, More Tricks

I THINK ALL OF US CAN AGREE THAT PC MEDIA PLAYERS ARE ABOUT FOUR OR FIVE GENERATIONS AWAY FROM PERFECTION. NOW, OUR MULTIMEDIA RUNS CORRECTLY

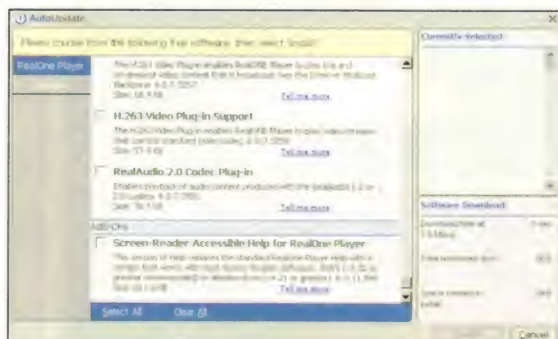
on one player but not another. As more functionality pours in, and MP3 players become streaming media players and then grow video decks and device managers, some of these interfaces are becoming busier than Elvis' jumpsuit. And so, this month we finish our overview of quick fixes and operating tips for some popular media players: the RealOne Player Plus and the venerable Winamp, now in version 3.0. (See page 95 of the March *CPU* for tips on Windows Media Player and MusicMatch.)

RealOne Player Plus

RealNetworks' media player software used to be ubiquitous, the clear winner in the streaming media category over wannabe Microsoft's Windows Media Player. Although not quite the presence it once was, the newer RealOne Player Plus remains a fixture on many desktops. We used RealOne Player Plus Ver. 2 (\$19.95). This premium version allows faster CD burning than the free version and includes an integrated Web browser and equalizer. Access to RealNetworks' premium content comes bundled with some trial packages at various prices, but you should be able to buy the player at the one-time fee with no strings attached.

Download DivX drivers. If you are getting a lot of error messages from RealOne about not being able to find the right decoder to run a clip, you may need to

install the DivX codec. If you are puzzled about hearing the audio track in a video file but not getting a picture, this is because some DivX multimedia files use MP3 encoding for audio, which RealOne can play without modification, and MPEG-4, which requires installing an additional codec from outside of the player software.



Use the RealOne AutoUpdater to mine the RealNetworks server for a number of plug-ins, such as the invaluable H.263 Video codec, which adds support for video conferencing and other common video streaming formats to RealOne.

Go to www.DivX.com/divx for download options and choose your version carefully. The "free" DivX Pro loads the GAIN ad-serving spyware when the codec installs on your system. Another, fully free version has stripped-down DivX player software, but it also has the codec, which is all we are looking for here. When you install DivX, it gives you the option to forgo the player and just load the codec. Once it is installed, try those troublesome video clips again; odds are they will play correctly.

Get the good stuff. Like Windows itself, RealOne Player can access a number of valuable add-ons through its internal auto-update feature. Make sure you get the good stuff. Click Preferences from the Tools menu. Then click the AutoUpdate category on the left to check the currently installed plug-ins. Click the Check For Update Now to contact the RealNetworks server.

Go to the Drivers section to get the beta version of a plug-in that lets you run Windows WMA audio files via RealOne. Installing this plug-in requires a full system reboot to take effect. Also get the H.263 Video plug-in from the RealOne Player section. This plug-in installs a valuable video codec that is used for some video conferencing and Internet streaming applications.

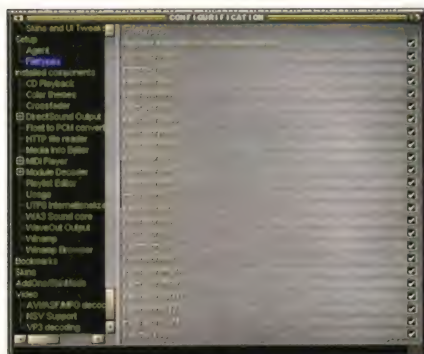
Mini-me. One of our favorite RealOne mods actually comes in the form of a skin, so it is easy to miss. In the Preferences dialog box (Tools, Preferences), click Skins on the left side and then click the Get More Skins button. This brings you to the RealNetworks servers and its skins collection. To turn the otherwise massive, screen-hogging RealOne Player into a more polite and compact player, download and install the Mini-Bar skin from third-party designer Omega Websites.

Load the Mini-Bar skin, and your player becomes a slender line of controls you can tuck into any corner of your screen. The full RealOne menu structure is still available in this mod. Just right-click anywhere on the Mini-Bar to get a single context menu that compacts all of the usual RealOne choices.

Don't be deceived by the labeling and the music-player look of the Mini-Bar. It actually runs video in a small window, as well. Start a video file and use the misnamed V (Visualization) key to bring up the screen.

Unfortunately, the otherwise superb Mini-Bar skin does sacrifice the user's ability to expand the video screen size.

Quiet recordings. Recording from CDs in analog rather than digital mode sends the audio signal through your sound card, where it can pick up loads of noise from the other analog channels that remain open on most systems.



Winamp's Configurification Registry is for advanced Winampians only because it opens virtually every program setting for you to screw up, er, tweak.

Any of the moving parts in your PC, hard or optical drives—even our mouse's scroll wheel—can add pops and other audio garbage both to playback and some recordings. We're not joking; the scroll wheel on our mouse adds high-pitched squeaks to the audio playback via the line-in channel. Go figure.

When recording from CDs in analog mode, eliminate the chances of getting these extra noises by opening your system's Volume Control and muting unnecessary channels. If you have a speaker icon in your System Tray, double-click it to bring up the Master Volume dialog box. Otherwise, open the Control Panel and click Sounds, Speech, And Audio Devices, then Sound And Audio Devices. In the Device Volume section under the Volume tab, click the Advanced button to open the Master Volume dialog box, which contains sliders for every audio channel on your sound card or from your integrated audio on the motherboard. The usual suspects here are the Line In, Auxiliary, and Mic-in channels, so mute these if you don't need them. Remember that

not all audio devices will have any or all of these channels available at all.

Audio artifacts can occur on digital recordings for numerous reasons, but try dedicating more processor power to the recording and changing the recording mode to eliminate most of them. Go to the Preferences dialog box from the Tools menu and then click CD, Advanced CD in the Category section. In the Save CD Method section, click the Advanced button. In the Advanced Save CD Options dialog box, move the slider in the Performance section to Highest CPU Usage to dedicate more CPU share to ripping from your CDs.

Finally, try using the Variable bitrate (VBR) setting when ripping tunes from a CD to MP3s on your hard drive, which lets the RealOne Player determine the most efficient way to encode music at high recording levels. In the CD category of your Preferences dialog box, highlight MP3 Audio in the Select A Format box and then toggle the Use Variable Bitrate radio button beneath the Select a Quality Level box.

Exploit hi-fi. If you have a high-end sound card or anything that can handle 48KHz output, then you might squeeze a scintilla of extra playback quality from RealOne. In the Preferences dialog box, highlight Hardware and click the Settings button in the Sound Card Compatibility section. Move the Playback Quality slider all the way to the right, but you will have to listen awfully hard to hear the difference between a 44KHz and 48KHz audio stream, even on most CDs.

Our favorite shortcuts. RealOne has a somewhat hidden video acceleration

shortcut that works much like the fast scanning mode in DVD players. Press ALT-[for rewind and ALT-] for fast forward to move through a video clip at 10X speeds. To resize the video window on the fly, press CTRL-SHIFT-UP arrow to shrink and CTRL-SHIFT-DOWN arrow to enlarge.

Winamp

For MP3 diehards, there will always be their first true love: Winamp. Kludgy and distinctly user-unfriendly though it may be, Winamp is the geek classic many prefer, and it enjoys a dense online community of plug-in developers and modifiers. We're using Winamp 3.0c for these tips, which is a free, full-featured version.

Get configured. The Configurification Registry is a must-have for advanced Winamp lovers, but Nullsoft keeps it fairly well hidden from casual downloaders because it is a bit like a Registry Editor for Winamp. You can snatch the Configurification Registry at www.winamp.com/components3/detail.jhtml?componentId=119523, but use with care.

After installing the Configurification Registry, access it by choosing Windows from the Main menu (that's the second little box in the upper left corner) and selecting the Configurification Registry option. Make sure you have the latest version of Winamp 3 to ensure the Configurification Registry will work correctly. The program gives you total, one-screen access to all of the player's settings, but like much of Winamp, it fails to give a clue about what some of these settings mean. Be careful in here, as some of the settings can muck up your configuration.

Registry Tweak

Shrink Outlook To Your System Tray

If you keep Outlook open much of the day but would rather not have it cluttering your Taskbar, you can tell WinXP to stow the program in your System Tray instead. This gives you ready access to the program but removes the program from the usual cycle of ALT-TAB task switching as it also tidies up the Taskbar.

This works with Outlook 2002. Go to the HKEY_CURRENT_USER\Software\Microsoft\Office\10.0\Outlook\Preferences Registry key and make a new DWORD Value labeled MinToTray. Double-click the new DWORD Value and type 1 in the Value Data text box to minimize Outlook to the System Tray; type 0 to minimize it as usual to the Taskbar. ▲

use Movie Maker 2 to record entire TV shows with a TV tuner card and save and edit them later. Tools for making voiceover narration and synching audio and video in a timeline are much easier to use. If you want a free and easy editing tool, this is well worth the 11.9MB download at www.microsoft.com/windowsxp/moviemaker/downloads/moviemaker2.asp. ▲

Winamp shortcuts. Unlike RealOne Player, Winamp don't need no stinkin' new skin to shrink itself. Most Winamp windows will shrink themselves down to the most essential buttons if you double-click their title bar. And, no, it isn't just you or your aging eyes; the Winamp buttons and text labels are impossibly small, especially if your Desktop resolutions are high . . . and you're over 40. Click the component window you want to enlarge and press CTRL-D to magnify it independently of the others. You may need to reattach the component windows after resizing, but small and large-sized windows can be attached to one another. Winamp

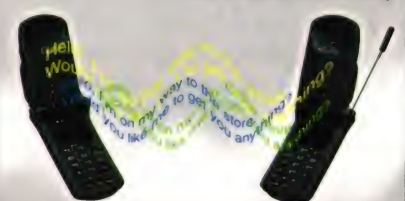
According to what other plug-ins you have installed in Winamp, you may be able to use Disk Writer to convert a track into a range of other formats. In the Preferences dialog box (CTRL-P), click Disk Writer under Audio on the left. The Format drop-down list lets you choose which conversion format to set as the default. **CPU**

Infinite Loop

Got Text?

America hasn't quite caught on to SMS messaging. Only 20% of Americans with mobile phones use SMS, while more than 41% of European mobile phone users are SMS fans. Don't blame young users for the low U.S. number; 45% of U.S. users between 18 and 24 send text messages. SMS is more popular throughout Europe than the Internet. British users, for example, rely on SMS more than email.

SOURCES:
InfoWorld: [HTTP://ARCHIVE.INFOWORLD.COM/ARTICLES/ny/xml/02/12/16/021216hnmobile.xml?m=REUTERS](http://archive.infoworld.com/articles/ny/xml/02/12/16/021216hnmobile.xml?m=REUTERS)
GARTNER: [HTTP://WWW3.GARTNER.COM/5_about/press_releases/2002_11/pr20021105a.jsp](http://www3.gartner.com/5_about/press_releases/2002_11/pr20021105a.jsp)



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WARM UP TO PENGUINS

Control Who Does What, Where & How With sudo

IN MARCH'S *COMPUTER POWER USER*, WE DISCUSSED WAYS TO MAKE THE MOST OF YOUR RAM. THIS MONTH WE FOCUS ON USING THE SUDO TOOL.

Sometimes maintaining security is a pain. When security measures become more onerous than useful, users tend to find clever (and sometimes dangerous) ways to circumvent them. Rather than risk your system's security to add convenience, make use of the sudo tool (<http://www.courtesan.com/sudo/sudo.html>); it lets you allow certain users to perform certain tasks on your system without swinging the doors completely open.

In short, sudo lets a system administrator specify which regular users may run which important system commands. These commands aren't run as the *regular* user, but instead are run as the *administrator*, meaning you don't have to weaken your access permissions or create bizarre new groups that could result in unintended consequences.

Introduction To /etc/sudoers

Configuring sudo involves editing the /etc/sudoers file. Rather than editing the file with a text editor, work on it by typing visudo at the command line as the root user. Depending on your Linux distribution, this opens a vi or vim session, which looks something like that in Figure 1, which accompanies this article. All entries in the file follow the same pattern, which in general we can represent as:

rule definitions

The meanings for rule and definitions statements depend on what the entry type you are building is. There are two types of entries in /etc/sudoers, including alias and user.

Let's start with aliases. There are four alias types that you can work with: User_Alias, Runas_Alias, Host_Alias, and Cmnd_Alias. User_Alias lets you set up a list of users you can refer to with a single name, in the form of:

```
User_Alias    ALIASNAME = user1,
               user2, ..., userN
```

You don't have to strictly use login names for the users. You can also use groups. Do this by putting a percentage sign in front of the group, such as %users. You can also use netgroups (as defined in /etc/netgroups) by putting a plus sign (+) in front (+servers) and UIDs (userids) by using a hash (#) in front (#503). To lump together users joe, bob, and mary with groups team 1 and team 2, you might have this:

```
User_Alias    NEEDCD = joe, bob,
                  %team1, mary, %team2
```

The alias name is in all caps, with only numbers and an underscore (_) being the other items you can use in the alias name. The alias name must also start with a capital letter and not a number or underscore.

Runas_Alias is different. It lists users as User_Alias does, but the user list refers to those users a person can run programs "as," the equivalent of using the su command or the SUID permission flag to run an app under another user's userid. (Take care when using this.) Runas_Alias is handy for such things as a teacher listing her students if she needs to test the students' code. An example Runas_Alias might be:

```
Runas_Alias    CS101STUDENTS
                = jon, kim, frank, jeff, mary,
                  heidi, jen,tom,\ %cs101tas,
                  %cstas
```

Notice the backslash (\). When an alias definition runs too long to fit on a single line, the backslash tells sudo the definition continues on the next line.

With Host_Alias, rather than referring to user accounts, it defines groups of machines. Your options include using host names, IP addresses, network numbers, and netgroups (using a + at the beginning). A Host_Alias statement might look like:

```
Host_Alias    DORMS = 192.168.1.0,
```

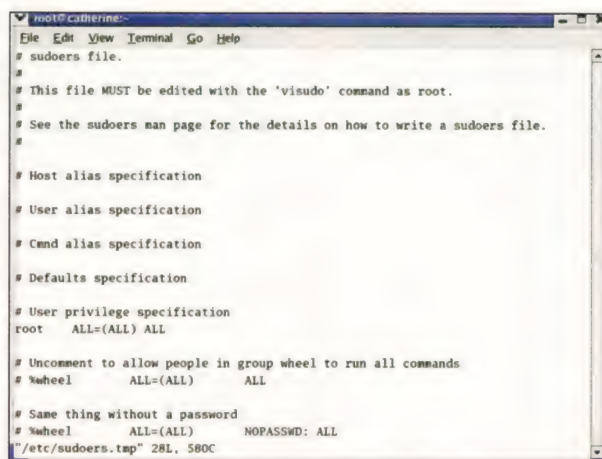


Figure 1. This illustration shows the /etc/sudoers file, as opened with visudo. From here you can edit the file based on what you want other users to be able to do with the system.

So, you might use something similar to the following in its simplest form:

```
User_Alias    CDUSERS = dee, bob, stan,
                  shelly, liz
```



Corel Linux Lives On, Sort Of

If you've ever used and liked Corel Linux, you might have noticed that it's no longer available. No worries, though. The Corel folks have licensed the product to Xandros (www.xandros.com). The full version gets you integrated CodeWeavers (www.codeweavers.com) products for running a variety of Microsoft productivity programs, including Microsoft Office 2000. If you're trying to get Linux-nervous users to take a walk on the tux side, point them to Xandros.

```
192.168.2.0, 192.168.3.0,
192.168.9.0/24 \
guest1, guest2, guest3,
209.141.2.1
```

```
Host_Alias CLASSSERVERS =
192.168.5.[3-70]
```

Cmnd_Alias is the final alias type. With it, you tell sudo the specific commands you want to allow/disallow. It's important to test everything so there are no unintended consequences. The values allowed with a Cmnd_Alias include commands (including the full path to the command) with any necessary flags and options and directories. A Cmnd_Alias statement might look like:

```
Cmnd_Alias CD = /bin/mount -t iso
9660 /dev/cdrom /mnt/cdrom
```

There are some additional subtleties, such as the ability to use an alias in another alias' definition and the ability to exclude items by putting an exclamation point in front. To see the full documentation, type **man sudoers** at a command prompt.

Alter The Defaults

The next section of the file lets you alter sudo's default settings. Each entry is in the format of:

```
Defaults[special] changes
```

All the parameters you can alter with the Defaults statement are in the man page. Each default setting, and other Defaults subtleties not covered here, is given in the

documentation. The setting type (flags, integers, strings, or lists) determines how you can change the setting. Also, whether you can deal with an item in a Boolean context or not determines if you can alter a setting. To activate an item that's off by default, list it. For example, the following will set up all use of sudo to email the site administrator at the admin address whenever someone attempts to use a sudo-handled process but enters the wrong password:

```
Defaults mail_badpass, mailto=
"admin@example.com"
```

To deactivate a setting that's on by default, use an **!** at the item's beginning for a Boolean type. For example, if we're not using the syslog logging daemon on the machines handling the members of the CS101STUDENTS alias. We might use:

```
Defaults: CS101STUDENTS !syslog
```

Once we've dealt with the aliases and defaults, we can get into crux of the sudoers file: the user specifications. The format for these entries varies, but roughly, they are:

```
user rules
```

The user item can be a single user's login name or an alias. You start to build a rules statement in a user specification by deciding if the programs you're working with should run as a particular user account. The default assumption is root; try to avoid running things as root if you can help it.

Let's say we want the NEEDCD alias members to be able to mount the CD-ROM on the machine host1, even when other users can't. Let this run as root unless you want to get fancy, so we'll start with:

```
NEEDCD host1 = commands
```

Nothing special here, yet, but now we must decide which programs are involved. In the case of the CD-ROM, the command to mount it on many Linux systems is:

```
mount -t iso9660 /dev/cdrom/mnt/
cdrom
```

This would give us the following if we didn't want these users to have to use a password to mount the CD-ROM drive:

```
NEEDCD host1 = NOPASSWD:
mount -t iso9660 /dev/cdrom
```

```
/mnt/cdrom
```

We can have more than one item defined on the same line (you can see this by reading the sudoers manual page). There's also the ALL alias, which is available in many of the definitions here.

The last example is more complicated. Let's say you want all students taking Computer Science 101 to be able to run commands in the directory /classes/cs101 on the machines in the network classes.example.com, but you don't want them to be able to use the su command to access anyone else's account. You might use:

```
CS101STUDENTS CLASSSERVERS
= /classes/cs101, !su
```

Practice Your sudo

Using sudo takes some experimentation, er, the time is worth it compared to the weakening of your existing security measures. **CPU**

by Dee-Ann LeBlanc

Infinite Loop

Give Me The Ballistics

A new complement to your local Neighborhood Watch program could be the On Alert Gunshot Detection System (GDS), currently in development. The system combines listening devices with GPS and audio recognition technologies. The resulting product can identify a particular gun type and its location by the sound the weapon makes when firing. (Hey, hear that gunshot? That's a .380 Walther PPK at the intersection of Main and First Avenue!) The system can record the gunshot and transfer all the pertinent data about it to police dispatchers or officers in the field. Related products in the development scope may focus on other types of sounds, such as screams or vibrations, and notify emergency personnel of impending events, such as tornadoes.



KILLER HARDWARE TIPS

Mobo Decisions & Hidden PVR Goodies

IF YOU'RE A USER WHO CAN'T LEAVE THINGS ALONE IF THERE'S A CHANCE YOU CAN MAKE THEM BETTER, EVEN IF IT MEANS BUCKING THE NORM, READ ON. WE HAVE SOME TIPS

and tricks that just might make you more productive.

Your PVR Has A Secret

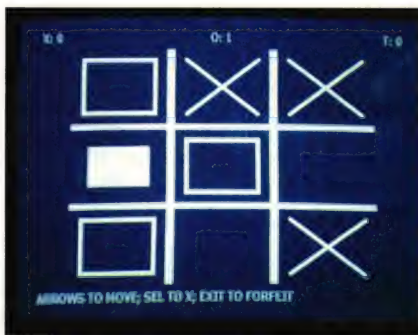
Easter eggs—messages, games, tricks, and other goodies hidden in computer software—have been around since the 1970s. Sometimes Easter eggs are simple, such as a message from a programmer. Other times, the egg is a hidden debugging tool or elaborate feature that was removed from the official version for one reason or another. Secret features in firmware are increasingly common, too, such as the iPod's hidden Breakout game.

But do you know about the goodies hiding within your personal video recorder? Your ReplayTV or TiVo is brimming with hidden tricks and features—you just have to get to them.

ReplayTV has a 30-second skip button, which makes it easy to zip past commercials. TiVo also has a 30-second skip feature—if you know how to activate it. A Web site at www.bigmarv.net/how/tivo30secondskip.html describes how to do it. Essentially, while you're watching a recorded program, enter the following sequence on the remote control: Select, Play, Select, 30, and Select. From then on (unless you need to reboot), the ->| button on the remote will give you a half-minute jump.

Other hidden features include the ability to view TiVo's log files (use the Clear, Enter, Clear, and then Thumbs-Up sequence) and view "hidden" recordings and scheduled program suggestions (use the

Thumbs Down, Thumbs Down, Thumbs Up, and Instant Replay sequence). You can find many more TiVo codes in the Hacking The TiVo FAQ Index at www.tivofaq.com/hack/faq.html and the Underground Playground section of the TiVo Community Forum at www.tivo.com/community.com/tivo-vb.



Do you want to play a game? Your ReplayTV does, if you know how to ask.

With ReplayTV, pressing 243 and then Zones on the remote control reveals a utilities menu where you can force an update of the programming guide or check the amount of free memory. This menu is also the home to a text box, cryptically known as the "claw foot portal."

The claw foot portal is a window that gives you access to several fun features. For example, you can enter "MODESTO GIRL" to change the ReplayTV's red Program Record dots to hearts. Enter "TIC TAC TOE" in the claw foot portal to enable a familiar, mind-numbing

game, and then press 111-Zones to play. (Some ReplayTV models offer other simple games, too.)

Some useful features include entering SHOWGUARD ON in some models into the text field, which enables a padding feature that can prevent you from missing the last minutes of your favorite program if the network should be off schedule. These and other hidden features are documented at www.replaytvfaq.com.

By the way, the first Easter egg is generally credited to Warren Robinett, the creator of the Atari VCS game Adventure. Annoyed that Atari didn't give credit to the game's programmers, Robinett built a secret room in the game that showed his name in bright letters.

Sometimes Less Is More

The first step in building or upgrading a PC just might be the most fun. It's the step where you agonize over the components to put in or upgrade your PC with. With the perfect motherboard, processor, video card, sound card, and other components, system builders can tune a PC according to their exacting specifications.

But more often, DIY PC builders are finding many new motherboards have built-in video, audio, and Ethernet ports, which sometimes conflict with the add-on cards the builder has painstakingly chosen.

Using integrated video and audio has been a popular approach on value-segment OEM computers (marketing speak for "inexpensive, prebuilt PCs") for years. Using such motherboards means PC manufacturers need to buy fewer components, thus saving money. An onboard sound chip adds about \$2 to the cost of a motherboard "for sound of the same quality as a \$30 to \$40 sound card," says Andy Tung, MSI senior product manager. Of course, an integrated chip won't touch the quality of a high-end sound card, which Tung estimates only 5% of customers want.



Most Popular Mobos

The most popular motherboards with and without integrated video and audio, according to various motherboard manufacturers, include:

Built-in audio and video:

Intel: EPoX EP-4G4A+, SOYO 7VEM Pro, and Tyan's Tomcat i845GL S2098, Trinity i845E S2099, and Tiger 200T S2505T

AMD: EPoX EP8RGA+, MSI MS-6378X and MS-6390, and SOYO K7VEM Pro

Without built-in audio and video:

Intel: EPoX EP-4PEA+ (6-channel sound only), SOYO P4i845PE (sound and LAN only), and Tyan Tiger 230T S2507T

AMD: EPoX EP-8RDA+ and EP8K9AI (6-channel sound only); MSI KT3V, KT4V, and K7N2; SOYO KT400 Dragon Ultra Platinum Edition; and Tyan Tiger MPX S2466

It's apparent that all-in-one motherboards aren't going away. Because of their popularity with OEMs, sales of integrated motherboards already outstrip standalone models. MSI expects a 5% increase in integrated motherboard sales relative to standalone boards this year.

Built-in video/audio functions are generally designed to be good enough to meet the

audio, and Ethernet is the obvious answer. But even if you choose a motherboard without built-in video, you may still run into integrated sound and Ethernet. The majority of motherboards sold today include at least built-in sound, and many add an Ethernet port, too.

"VAR [value added resellers] channels are asking for motherboards with integrat-

ed audio and networking. Network cards aren't all that expensive but having those features onboard makes things easier and cheaper. When these customers are reselling to corporations, government, schools, and the military, they want to keep these things rock solid," says Vivian Lien, SOYO's marketing manager.

If your prospective board has some of these features, make sure you can disable them. Also make sure the mobo is compatible with your chosen video and sound cards when the integrated functions are disabled.

Disabling a mobo's built-in video/audio is generally done via the BIOS, although some use jumpers instead. Some boards automatically disable onboard video when a video card is plugged into the AGP slot.

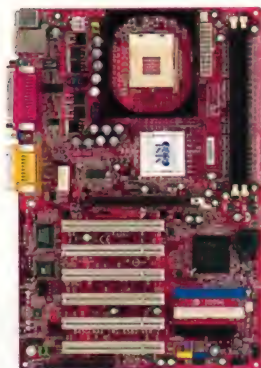
Once disabled, the motherboard should defer to the add-on card for sound or video. If there's still a conflict, the mobo

manufacturer's Web site may have a firmware upgrade to resolve the issue.

As a last resort, you can disable onboard video and audio at the operating system level, such as in Windows' Device Manager. Then switch to a standard VGA or sound driver, shut down, and install the new card. This should disable the onboard functionality, but it may not free those resources for other uses.

What does the future hold for integrated mobo components? Motherboard manufacturers agree that integrated A/V functions will become even more prevalent. But manufacturers understand that some users prefer to add their own upgrade cards, so we're likely to always have at least some nonintegrated models to choose from. At minimum, the ability to disable onboard output will remain. **CPU**

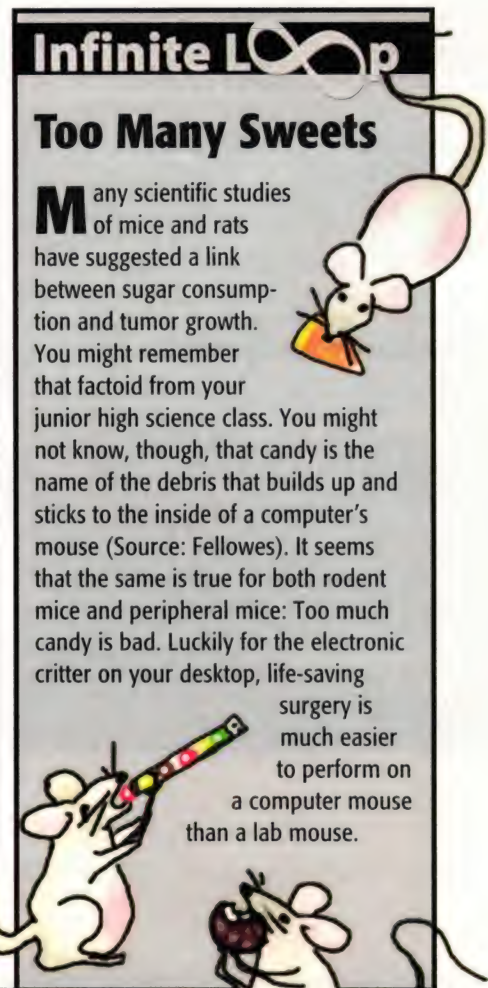
by Kevin Savetz



Motherboards that have built-in audio and video, like this one, free up slots but don't provide the performance of high-end add-on cards. Mobo manufacturers say boards with integrated components will only continue to become more prevalent, however.

needs of average users, but this usually does not satisfy the exacting needs of high-performance aficionados. "For generic users who use the computer at home, just playing some games or using office applications, do they really need a very powerful video card and very high quality sound card? Onboard video and onboard audio will be good enough for them," says Tung. For example, integrated audio typically includes 2-channel sound or even 5.1-channel sound, but no support for environmental effects.

What's a power user to do? Picking a motherboard without integrated video,



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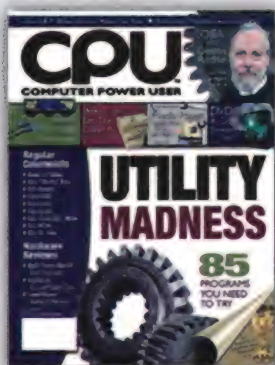


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Technically Speaking

An Interview With Ken Goldsholl, President & CEO Of PRISMIQ

Convergence is a bit like Armageddon: A lot of people think it will happen, but no one is sure when, and a lot of people get snuffed out in the process. Companies ranging from Microsoft and Intel down to long-extinct start-ups have tried to blend the worlds of home computing and living room entertainment. Most efforts have ended in failure.

Ken Goldsholl, president and CEO of startup company PRISMIQ, thinks he can make a difference. Two groups declared PRISMIQ's premier product, MediaPlayer, the best home network/automation product at January's Consumer Electronics Show. Unlike similar products in that field, MediaPlayer has no hard drive. You just snap it onto the home network, plug it into the TV, and enjoy your PC's multimedia content from the comfort of your couch. ▲

by William Van Winkle



CPU: What do you do with your MediaPlayer?

Goldsholl: I use it mostly for music. People talk about us not having a front-panel display, but I'm thinking it would be a hassle if we did. MediaPlayer displays all the songs on my TV set, and I can select which songs I want to listen to. If I had a one-line LCD display, I couldn't read it and I couldn't see more than one song at a time. Also, I have a 3-year old son, and a lot of little kids like to watch the same tapes over and over again. Total hassle, right? So I went out and bought an encoder. My plan is to go and just put some of his favorite tapes on the home server. Then he'll be able to play them whenever and however many times he wants—just as soon as he figures out the remote.

CPU: So, say you have dozens of videos on hand, thousands of MP3 files, and so on. With a keyboard, it is easy to sort

through all that stuff, but is it with a remote control?

Goldsholl: Most likely, you won't have hundreds of video files because other than the ones that you're going to want to watch over and over again, you're not going to store that many of them.

Right now, we use MPEG-2, but we'll be supporting other formats that are more efficient throughout the year. MPEG-2 uses about 1GB per hour. A 30GB drive only offers 30GB of video. I suspect you'll see services that will sell you video that gets downloaded to your computer in the middle of the night, and then you'll be able to watch it whenever you want to. It's a different distribution model than something like TiVo, which just takes content off the air. But I don't see you constantly storing and adding files. You can do that with MP3 files because they don't take as much space and you'll listen to the songs over and over again. With

video, though, other than for your kids, you may only save or archive the shows that you really like a lot.

CPU: Do you think wireless is the way to go in homes?

Goldsholl: Wireless is a way to retrofit, but if you're building a house from scratch, you're going to get much better performance out of CAT 5. It is more secure, and it'll probably cost less. It doesn't cost that much to put it in when you're building a house. If I'm plugging my TV set into the network, let's say five years down the road, TV sets will be built with Ethernet jacks rather than wireless. You have a lot more bandwidth available to you, and it's not shared.

Ethernet is 100Mb right now throughout the home. People talk about other wireless technologies that'll let you get up there, but there's always going to be issues with getting through walls and floors,

security issues. I'm not knocking it. Wireless is great for adding to a home that doesn't have Ethernet. But you should think of the network as just another service. You have voice, you have cable, you have electricity. You should have a network in there, too. I don't think you need a refrigerator that'll tell you what you need to order, but when you want to have a TV set and your alarm system talk to each other and allow you to remotely access information, the network becomes very useful.

CPU: When I look at the MediaPlayer, the only way I see myself using it today is to distribute all the MP3 files I've got sitting on my main PC to the house. But when you talk about the MediaPlayer, you keep referring to video. Why?

Goldsholl: Well, see, video generates more revenue than audio, so I think that's what can drive the product. You need less technology to do audio than video. I think you'll see a slew of boxes come out and do audio much cheaper than what's out there today. Basically, the volumes just haven't been reached. Also, the silicon that's available off the shelf for MP3 players isn't designed to be networked, but it doesn't take a whole lot to do that. If I was going to define a chip to make a networked MP3 player, you could see networked MP3 players—just players, no storage—for well under \$100. I expect chip companies will do that. I don't know why they haven't.

CPU: As the CTO of Polycom, what were your chief concerns?

Goldsholl: Well, I was CTO of the Network Access Division after Polycom bought my company, Atlas Communication. Being at Atlas led me to think about how you solve the problem of delivering services or digital services throughout the home. We were involved in voice over broadband there, and one of the reasons they acquired our company was they were hoping to take advantage of convergence

and deliver video over broadband, also. It didn't happen for a lot of reasons that were out of our control. A lot of what we were doing was predicated on CLECs [Competitive Local Exchange Carrier], and they all died. I think there was just way too much capital thrown at that market. You



PRISMIQ hopes MediaPlayer, its premier product, will change the way you use your multimedia content.

know, you have a very dominant telephone service provider in every market in the U.S., and then all of a sudden in the largest markets, there were three new competitors going after that business. I think one competitor could survive, but three of them? There just was never a chance of them all surviving, so they all died.

I think if you poll any of the executives of the leading technology companies in the country—Cisco, Intel, Microsoft—I'm sure they'll tell you the number one thing that holds back growth in their industry and the economy in general is the lack of broadband to the home. There's a lot of capacity out there in the core and the long lines, but that's where all the money was spent in the 1990s. So you've got a lot of highways and interchanges, but you really have no way to get around town. It's all dirt roads leading to those eight-lane interstates.

CPU: What needs to happen?

Goldsholl: There's got to be an investment made by the country. Here I am selling consumer products, and I'm saying our whole economy has become dependent on consumption. We're saying consume more, consume more, we need to

keep our factories and economy rolling. But what we really need to do is to have more investment in communications, energy, and transportation. These are things that pay dividends.

For broadband, we really need to go and bring higher-speed capacity to the home. I think municipalities are the ones that need to do that. I'm not calling for them to run networks, only for them to use their borrowing capacity with the very low cost of debt that we have here today to deploy fiber to the home. A lot of towns could afford to float a bond and run fiber to every home, then you go and contract out to a company to run it. You put that up for bid because you don't want the government running the networks, but they can pay to facilitate deployment of the fiber or whatever

it is so that you're not held hostage to any one service provider. The competition will eventually lower costs while you get much more bandwidth for high-definition TV, higher speed Internet access, and all the phone service you want.

CPU: But are moderately enhanced services that already exist in homes enough to persuade people and municipalities to kick out all of this infrastructure money?

Goldsholl: It might cost \$10 a month to finance the cost of putting the fiber in. But once the fiber is there, you'll be able to have IP service providers offer data services at less than what you're paying today. From a national scale, it's an investment in something that's going to lower costs as we go along, so it's going to have a return. It's not consumption, which is where we go and spend then the money is gone. It's not a question of just paying extra; it's making an investment that will lower expenses as you move forward. I think fiber to the home will create demand for a lot of new services. It will make things a whole lot more efficient, which will save people money in the long run and enable new businesses. **COU**

To read our entire interview with Ken Goldsholl, go to
www.cpumag.com/cpuapr03/goldsholl.



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Under Development

A Peek At What's Brewing In The Laboratory

Fresh from the most influential R&D labs around the world, here's a glimpse at some of the technology that scientists, lab techs, and researchers are cooking up for the future.

Need A Gadget? Just Print One

Perhaps you've already seen 3D printers from the likes of Z Corporation (www.zcorp.com). This MIT-derived technology uses inkjet printer heads to output starch or plaster, layer after layer, so that finished 3D objects emerge. But what if you could print plastics, metals, and other electronics-building materials from inkjet nozzles? You could print something such as a car alarm key chain or something as complex as a portable game pad.

Already, 3D-printer technology exists that can deposit polymers capable of yielding objects with fully functional moving parts. Now, John Canny, a professor at the University of California, Berkeley, is working to devise the means to print electrical components, such as capacitors, coils, and transistors. There would be no need to mount circuit boards into plastic chassis. The printer would merely build the circuitry up from the plastic bed, one layer at a time.

This emerging field of blending flexible materials and electronics is generally called "flexonics," and some believe it will reshape how electronics manufacturing is done. The potential to create on-demand, custom-crafted gadgets is entirely new and unexplored. However, polymer-based electronics are considerably slower than their silicon counterparts, which may limit flexonics appearing in certain areas. Additionally, because circuitry will be built into a device's casing, if any piece breaks, the entire gadget must be tossed. This may alarm environmentalists, but let's face it: No one repairs a light bulb or a \$40 wireless phone today, anyway. Hopefully, flexonics will develop with an eye toward increasing materials recycling. ▲

Contemporary 3D printers, such as this unit from Z Corporation, can output complex object prototypes, such as these cell phone faceplates, fashioned from starch or plaster. UC Berkeley researchers are working to develop similar printers that could output an entire cell phone.



Need An Organ? You Guessed It . . .

Tissue construction is emerging as a major medical industry. Scientists can take a degradable scaffold structure, cover it with cells in a conducive medium, and the cells will multiply to form large, sometimes shaped, swaths of tissue. This is fine for growing skin but isn't applicable for growing complex organic structures.

Vladimir Mironov of the Medical University of South Carolina and Thomas Boland of Clemson University have devised a method for using inkjet printing technology to deposit layers of cells, thus building intricate tissue structures in a short time.

"According to our estimation, we can print a kidney in two hours if we use a single-cell [deposition] approach. If we use an aggregate approach printing groups of cells, we can do it 10 times faster," says Mironov.

The process prints layers of cells onto a glass substrate. Each thin layer is covered by a layer of biodegradable gel. When fully printed, the gel is washed out. As the cell layers touch one another, they bond. A main problem in building something as complex as an organ is supplying blood and nutrient circulation to the tissue. Early tests show tubes can be constructed in printed tissue, but Mironov warns it may take 10 to 15 years to demonstrate a functional printed circulatory network.

Another problem is ascertaining the specifics of an organ. The only way to create a duplicate organ for, say, a patient with a failing kidney, would be to analyze the failing organ slice by slice or using next-gen imaging techniques to mathematically render it down to microscopic levels.

"Today, we can take a biopsy from a patient . . . and place these cells on five petri dishes. Then the oncologist says he has five antitumor drugs. Which drug is perfect for that patient?" says Mironov. ". . . then computer analysis helps to calculate the effect of each drug on those cells. But the problem is that this 2D approach is too primitive. If we can create 3D, human, vascularized tissue, then our predictive power becomes extremely close to doing an in-vivo experiment." ▲

Gaze Into Your Future Display

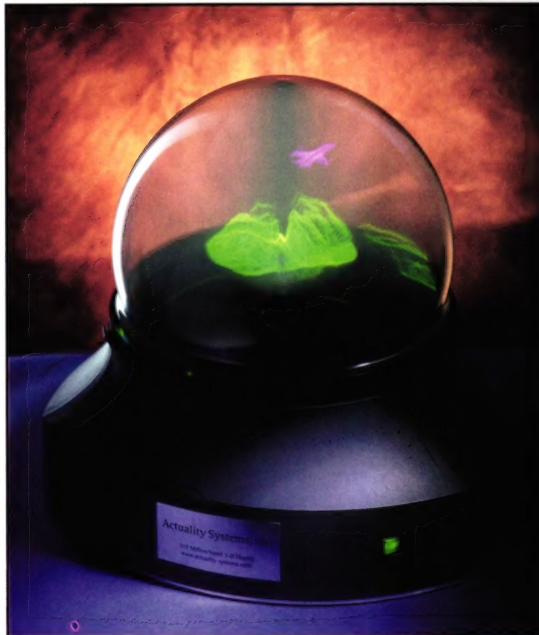
Remember the big glass ball the Wicked Witch of the West looked into to observe Dorothy and her friends? Bet you'd like something similar hooked to your PC, eh? For \$45,000, you can.

Actuality Systems (www.actuality-systems.com) designed and sells the Perspecta, a basketball-sized globe mounted on a mechanized stand. Under its glass surface, a rotating dome spins at 730 rpm, and a projection screen vertically bisects the globe's interior. Relay optics powered by DMDs (digital mirror devices) shine visual information onto the screen, displaying a high-resolution 3D image that looks like a hologram. The viewing angle is 360 degrees horizontal and 270 degrees vertical. The image resolution is 768 x 768 x 198, or roughly 100 million voxels, which are essentially pixels with 3D volume. The amount of information required is so intense the Perspecta uses a 1,600 MIPS Texas Instruments DSP chip and a SCSI-2 Wide interface.

Military and academic institutions are already using the Perspecta for advanced imaging, but Actuality's challenge is to increase quality while dropping the price.

"The first generation of DMDs had some real limitations," says Cameron Lewis, Actuality president and CEO. "One was that those million mirrors that are on

each one of the chips were mounted on a silver background, which caused a lot of ambient white glow within the ball. The next generation of chips will be mounted on a black background and have a greater degree of arc, so each on-off position will allow us to more brightly illuminate each voxel."



Do you want to really see a plane's flight path or videoconference with a true talking head? Actuality's 3D Perspecta display can make it happen.

Lewis says the technology is applicable to larger-sized domes once the market for more expensive units emerges. (A 20-inch dome

yields about a 10-inch spherical image.) He says the technologies behind Perspecta are undergoing a development path consistent with Moore's Law, doubling performance while halving the price. Once large-scale orders become common, Lewis expects component prices to drop by as much as 95%. This and moving to automated assembly could land a Perspecta-like display in the sub-\$500 category.

Surprisingly, Lewis remains aloof when asked about future applications.

"At the 1929 World's Fair, a group of scientists introduced the world's first television," he says. "After much debate, it was generally perceived that the value of television in the future would be for remote monitoring of weather stations. The first major network presentation on television was of radio announcers doing a radio play, if you can imagine anything less suited to the TV format. We're at the edge of a new way of looking at information. We have 100 times more data presented in true 3D than is now available on a standard computer terminal. How we exploit that will follow the traditional curve of any new transformational technology. It's just too early to predict." ▲

Can You Find Me Now?

You're in the Pirates of the Caribbean line at Disneyland when you realize your family has abandoned you. Not to worry. Your next-gen cell phone is equipped with positioning software based on the iLocator program.

iLocator is the brainchild of Harsha Nagesh, Yuh Jye Chang, and Anurag Srivastava, members of Bell's Optical Networking Research group. The trio conceived iLocator last summer, developing the software over two months of weekends. Essentially, iLocator pings a cellular network and triangulates a phone's position based on distance data from multiple cell towers. Police have used such data for years, but iLocator uses a permissions-based buddy list, as with instant messaging, to help track friends, family, and co-workers.

For example, you could send an iLocator invitation to a friend miles away. If she accepts, she's added to your tracking list and appears on your coordinate map, provided you set your tracking range to that distance. If your friend wants some privacy, an

"invisible" mode is available. As 3G bandwidths continue to gain in popularity, service providers may contract with map data companies so that buddy positions are superimposed on real-time maps.

Users will be able to set how often position data is obtained. Based on today's billing procedures, one ping would likely result in a minute of billed airtime. This could amass some hefty airtime bills, so providers would likely have to devise a new billing system apart from voice minutes. But the number of apps seems limitless, including everything from parents tracking their children to travelers homing in on a Chinese restaurant. ▲



Bell Labs' new iLocator software lets you monitor the location of buddies on your cell phone.

Back Door

Q&A With Esther Dyson

Esther Dyson has been called "The First Lady of the Internet." She's not a programmer or an inventor in the usual sense. But she's literate, broadly knowledgeable, and keenly insightful. Through her company, EDventure Holdings, she is an advisor on technological issues to companies and individuals. Dyson is a Harvard graduate, author, venture capitalist, technologist, former ICANN chairman, commentator, philanthropist, and perhaps one of the most influential voices online today.

Q When did you know you were headed for a life in this industry?

DYSON: I was really trying to avoid it because my father and my mother were a physicist and a mathematician, and I didn't want to compete with them. So I thought I would become a journalist and probably a novelist. Then I ended up writing for *Forbes* because *Variety* wouldn't hire me. More people wanted to write about the movies than about business, and then the most interesting part of business was high-tech. I went to Wall Street and covered tech companies, then ended up with [Compaq founder] Ben Rosen. So in one way it was completely by mistake, in another it was probably inevitable.

Q Five years ago, people were talking a lot about "information overload." Now, you almost never hear the term used. Have we become inured or complacent, or merely adapted to all this new stimuli?

DYSON: No, we've understood that it comes in different forms. So now we have words like spam. We certainly still have information overload, and it's now coming into cell phones and everything else, but we're developing better searching and filtering tools. In the end, you need to know who are the people you want to communicate with and what



permissions you want to have for them in terms of whether you receive their phone calls or emails. We're going to have to put the burden of figuring out if someone wants an email on the sender rather than on the recipient.

Q How would that work?

DYSON: If you want to send mail to somebody, you post a fine as a guarantee. Basically, if the recipient refuses your mail, the sender will pay some money. So if you don't want the email you've received, you get paid. Or you can say, it's OK, I do want it, and I won't charge you after all. You have a white list of people from whom you will receive email, and what this requires is an intermediary, sort of a general bond-posting agent, which could be an ISP or credit card company. It basically reverses the incentives, which have gone so haywire with email being almost free to send.

Q Obviously, you are a woman in a field dominated by men. As such, have you faced special challenges, or do you feel that you've been on an equal footing with the men in your industry?

DYSON: If I had been in a company such as HP or IBM or something, I'm sure I would have had the problems every woman has: getting heard, men feeling especially threatened by a woman competing in a corporate hierarchy, stuff like that. As a reporter, it was an advantage. People remember you, especially if you were young and asking lots of cute questions. I'm sure you've noticed that as a male reporter on occasion.

Q [Is this a jab? The writer wonders if his questions are too cute.]

DYSON: As a more adult person, fortunately, my main medium has been print, and my words have stood on their own to some extent. I mean, I can certainly give you plenty of stories, as many women can, about some particular person not listening. My own favorite one was two or three years ago. Some guy asked what I did and, kind of joking because he clearly didn't know much about the Internet, I said that, among other things, I run the Internet infrastructure. This is a sort of poor description of ICANN, but it was close enough. He looked at me and said, "Oh, yes, they have such a nice network here." And I said, "No, I mean the Internet infrastructure of the world."

I think being a woman or a minority, you tend to have a better ability to see what's going on because you're not in the center. You can always see better looking in from outside rather than being in the middle. You're not simply following all the cultural assumptions.

For our full interview with Esther Dyson, subscribers can go to www.cpumag.com/cpuapr03/dyson.

William Van Winkle began writing for computer magazines in 1996. He was first published in 1990, the same year he took his first job in computers. He and his family live outside of Portland, Ore.



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